

App No:

2022091949

Revisions received 10.20.22 - JE

Application General Information

Applicant Name	Jacobs Telecommunications	Received	9/14/2022
Application Type	Minor Modification	Ann. Plan?	Yes
Carrier	AT&T Wireless	Will site be used to support government telecommunications facilities or other equipment for government use?	Yes
Solution Type	Macro		
Existing	Existing		
		Gvt. Use Desc.	Deploying CBAND freq

Application Description

Remove (3) Antennas and all existing TMAs and Diplexers. Install (6) Antennas stacked in same position. Swap equipment cabinets.

Site Information

Site Id	27	Zoning	NR-0.75 H-50
Structure Type	Building	Latitude	38.9747
Street Address	7051 Carroll Ave	Longitude	-77.01045
County Site Name	Takoma Tower	Ground Elevation	282
Carrier Site Name	Tulip Ave	City	Takoma Park
Site Owner	Takoma Tower LP	Lease Status	Leased
Structure Owner	Takoma Tower LP	Does the structure require an antenna structure registration under FCC Title 47	No
Existing Structure Height	111'	Distance to Residential Property (New, Colocation Only)	
Provide the proposed height of the replacement structure without any antenna (New Apps Only)		Distance to Commercial Property (New, Colocation Only)	

Justification of why this site was selected:

Existing site, equipment upgrade required

Nearby Sites (New Apps Only):

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Screening considerations(New, Colocation Apps Only):

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6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only)

Yes

For towers outside the public ROW will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 20 feet, whichever is greater?

No

Will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 6 feet?

No

For towers outside the public ROW will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 20 feet?

No

Will the proposed installation require more the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets?YN

No

Will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 10 feet, whichever is greater?

No

Does the structure or current installation have concealment elements/measures?

No

Will the proposed installation require excavation or expansion outside the current boundaries of the site?

No

If yes, describe how the proposed installation does not defeat the existing concealment.

Small Wireless Facility Information

Small Wireless Facility Questions

Small Wireless Facility?

No

Is the structure 10% taller than adjacent structures?

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet

Please list adjacent structure heights

Cumulative volume of the proposed antenna(s) exclusive of equipment in cubic feet

Tribal Lands?

No

ROW Information

PROW?

No

Pole Number

ROW owner

ROW width

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Antenna Information

Antenna Compliance

Compliance Desc

Antenna Location

Antenna Loc. Desc.

Env. Assessment

Cat. Excluded?

Routine Env. Evaluation

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

Antenna Model

Frequency

RAD Center Max ERP Antenna Dimensions Quantity

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475589A AEQK C-band Radio Unit Technical Datasheet

HW Unit Technical Datasheet
V1.0

AEQK AirScale MAA 64T64R 192AE n77 200W

Technical datasheet

Product Specifications	
Standard	3GPP/FCC NR compliant, TDD
Band / Frequency range	3700~3980MHz
Supported RAT	5G
Max. supported modulation	256QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	200MHz
Occupied bandwidth OBW	100MHz+100MHz for 32TRX + 32TRX split mode
Total average EIRP	77dBm
Max. output power per TRX	3.125 W / TRX (200 W total) - SW settable up to 13 dB down
Dimensions / Volume	750 x 450 x 240 mm (H x W x D)
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	727 W (75% DL duty cycle, ETSI Average)
Optical ports	2xSFP28, 10/25GE eCPRI
Other interfaces / Connector type	LMI / HDMI, RF monitor port / SMA, Control AISG, External Alarms / MDR26, status LEDs
Operational temperature range	-40degC to +55C
Cooling	Natural convection cooling
Installation options / mechanical tilt	Pole, wall, with vertical adjustment of $\pm 15^\circ$ (thermally limited)
Ingress / Surge protection	IP65/Class II 20KA

AirScale High Power MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Digital beamforming for multi-user MIMO
- Connectivity with AirScale BBU (via eCPRI)
- Beamforming capable 64T64R with total 200W output power
- 32TRX + 32TRX split mode support



AEQK 475589A

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AEQU Datasheet

Preliminary Datasheet

AEQU AirScale MAA 64T64R 192AE n77 200W

Technical data (Preliminary)

Product Specifications	
Standard	3GPP/FCC, TDD
Supported RAT by HW	5G
Band / Frequency range	3450 - 3550 MHz
Max. supported modulation	256 QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	100 MHz
Occupied bandwidth OBW	100 MHz
Total average EIRP	77.5dBm
Max. output power per TRX	3.125 W / TRX (200W total)
Dimensions / Volume	750 x 450 x 240 mm (H x W x D) / 71.7 L
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	730 W (75% DL duty cycle, ETSI 24h average load)
Optical ports	2 x SFP28, 10/25GE eCPRI
Other interfaces / Connector type	AISG / RS-485, EAC (6 alarms + 1 control) / MDR26, RF Monitor Port/SMA, 4 status LEDs
Operational temperature range	-40 °C ... +55 °C
Cooling	Natural convection cooling
Installation options	Pole / Wall, ± 15° mechanical vertical tilt
Ingress / Surge protection	IP65 / Class II 20 kA

AirScale High Power Wide Band MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Beamforming capable 64T64R with total 200W output power



AEQU 476085A

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Radio Frequency Safety Survey Report Prediction (RFSSRP)

AT&T Mobility Rooftop Facility

<u>Site ID:</u> TULIP AVE <u>Site Name:</u> TULIP AVE <u>Address:</u> 7051 CARROL STREET, TAKOMA PARK, MD 20912 <u>Latitude:</u> 38.974747 <u>Longitude:</u> -77.010437 <u>USID:</u> 3939 <u>FA:</u> 10072888	<u>Prepared for:</u> Jacobs <u>Centerline PN:</u> 950032-101 <u>Pace ID:</u> MRWSH048703; MRWSH048684 <u>Report Writer:</u> Zyotty Thamsil <u>Date:</u> October 19, 2022 <u>Report Reviewer:</u> Yasir Alqadhili
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Statement of Compliance

AT&T is compliant with FCC Regulations.

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1.0 GENERAL SUMMARY

Centerline Communications, LLC (“Centerline”) has been contracted to provide a Radio Frequency (RF) Analysis for the following AT&T Mobility wireless rooftop facility to determine whether the facility is in compliance with federal standards and regulations regarding RF emissions. This analysis includes theoretical emissions calculations, for all equipment for AT&T Mobility.

1.1 SITE SUMMARY

Analysis Site Data	
Site USID:	3939
Site FA#:	10072888
Site Name:	TULIP AVE
Site Address:	7051 CARROL STREET, TAKOMA PARK MD 20912
Site Latitude:	38.974747
Site Longitude:	-77.010437
Facility Type:	Rooftop
Compliance Summary	
Compliance Status:	Compliant
Maximum Modeled AT&T MPE% on Walking Surface (General Public Limit):	76.24%
Maximum Modeled AT&T MPE% at Ground Level (General Public Limit):	0.91%
Site Survey Data	
Is Access Locked or Controlled? :	Unknown
Lock or Control Measures if Present:	Unknown
Parapet Height:	19"
Site Data Information	
CD:	5G NR 1SR CBAND_10072888_AE203_20220601_TULIP AVE. Rev 0ss_RL_6.13.22
RFDS:	WASHIN~3



Signage and barriers are the primary means of mitigating access to accessible areas of exposure. Below is a summary of existing and recommended signage at this AT&T facility.

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken						
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0
Alpha	0	0	0	0	0	0
Beta	0	0	0	0	0	0
Gamma	0	0	0	0	0	0

Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Alpha:

- No action needed.

Beta:

- No action needed.

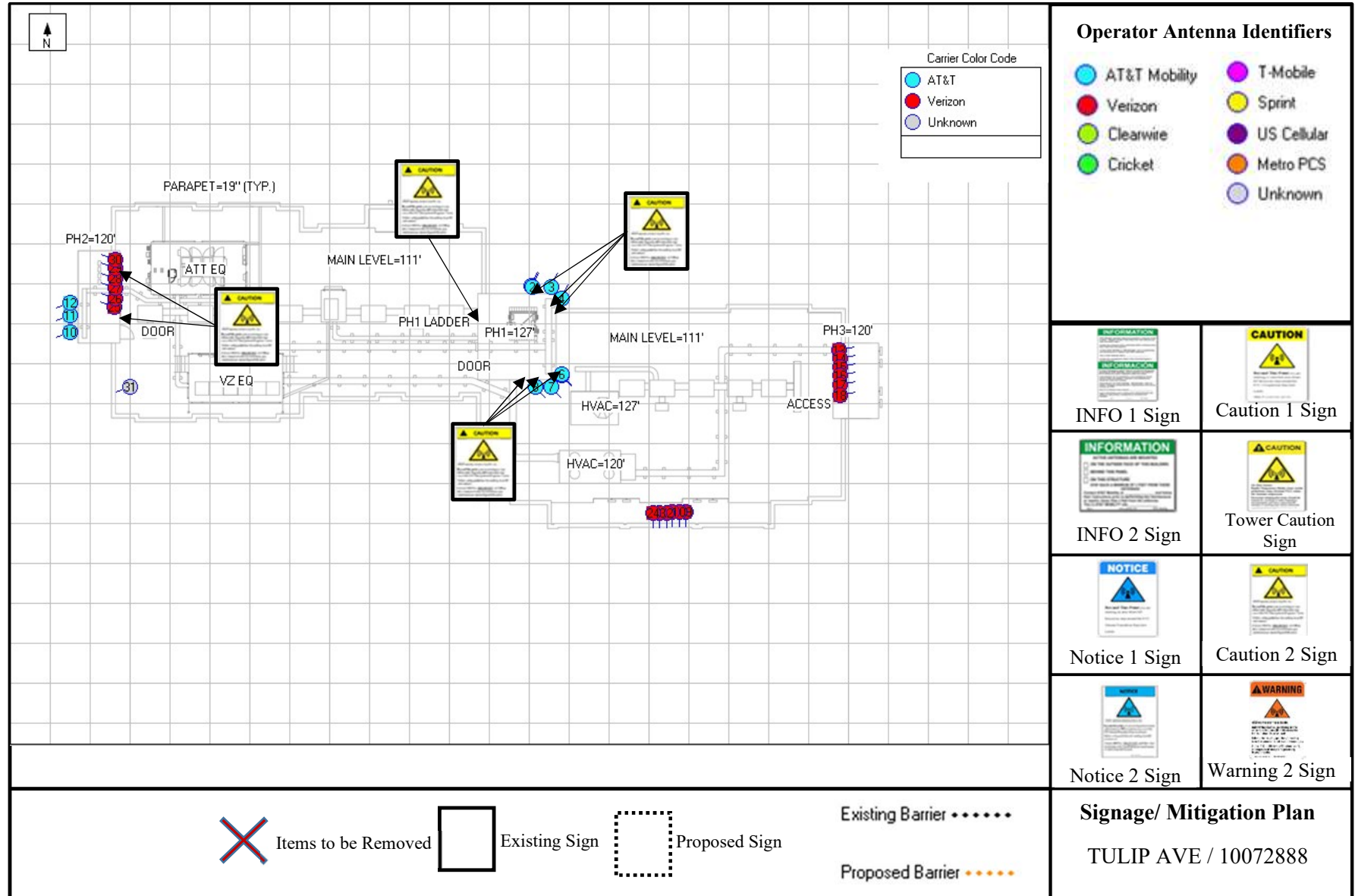
Gamma:

- No action needed.

Notes:

- The existing Caution 2 sign on PH1 ladder is not required and can be removed.
- The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.
- The MPE limit is exceeded on top of the HVAC units in front of Beta sector. There are no fixed access points to these areas. Ensure any maintenance workers accessing the top of these units are trained in RF Safety procedures and wear personal RF monitoring equipment.

2.0 SITE SCALE MAP



2.1 C-BAND ANALYSIS

- All adjacent buildings are >68' away laterally from the AEQK/AEQU antennas and/or >15' below the bottom tips of the AEQK/AEQU antennas.



3.0 ANTENNA INVENTORY

ANT ID	Operator	Antenna Make	Antenna Model	Type	Freq (MHz)	TPO (Watts)	# of TX	Azimuth (°)	BW (°)	Gain (dBd)	Total ERP (Watts)	Length (ft.)	Antenna Z Value (ft.) AGL*
1	AT&T	Nokia	AEQK	Panel	3700	67.78	1	25	13	22.62	12390.86	2.5	113.25
2	AT&T	Nokia	AEQU (DoD)	Panel	3450	67.78	1	25	13	22.62	12390.86	2.5	116.75
3	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	25	70	10.75	1426.20	4.6	115.00
3	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	25	70	10.75	1426.20	4.6	115.00
3	AT&T	COMMScope	NNHH-65A-R4	Panel	1900	30.00	4	25	58	15.45	4209.02	4.6	115.00
3	AT&T	COMMScope	NNHH-65A-R4	Panel	2100	30.00	4	25	60	15.85	4615.10	4.6	115.00
4	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	2	25	70	10.75	713.10	4.6	115.00
4	AT&T	COMMScope	NNHH-65A-R4	Panel	850	30.00	4	25	70	10.95	1493.42	4.6	115.00
4	AT&T	COMMScope	NNHH-65A-R4	Panel	2300	18.00	4	25	63	16.05	2899.56	4.6	115.00
5	AT&T	Nokia	AEQK	Panel	3700	67.78	1	140	13	22.62	12390.86	2.5	127.15
6	AT&T	Nokia	AEQU (DoD)	Panel	3450	67.78	1	140	13	22.62	12390.86	2.5	130.75
7	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	140	70	10.75	1426.20	4.6	129.00
7	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	140	70	10.75	1426.20	4.6	129.00
7	AT&T	COMMScope	NNHH-65A-R4	Panel	1900	30.00	4	140	58	15.45	4209.02	4.6	129.00
7	AT&T	COMMScope	NNHH-65A-R4	Panel	2100	30.00	4	140	60	15.85	4615.10	4.6	129.00
8	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	2	140	70	10.75	713.10	4.6	129.00
8	AT&T	COMMScope	NNHH-65A-R4	Panel	850	30.00	4	140	70	10.95	1493.42	4.6	129.00
8	AT&T	COMMScope	NNHH-65A-R4	Panel	2300	18.00	4	140	63	16.05	2899.56	4.6	129.00
9	AT&T	Nokia	AEQK	Panel	3700	67.78	1	250	13	22.62	12390.86	2.5	105.25
10	AT&T	Nokia	AEQU (DoD)	Panel	3450	67.78	1	250	13	22.62	12390.86	2.5	108.75
11	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	250	70	10.75	1426.20	4.6	107.00
11	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	4	250	70	10.75	1426.20	4.6	107.00
11	AT&T	COMMScope	NNHH-65A-R4	Panel	1900	30.00	4	250	58	15.45	4209.02	4.6	107.00
11	AT&T	COMMScope	NNHH-65A-R4	Panel	2100	30.00	4	250	60	15.85	4615.10	4.6	107.00
12	AT&T	COMMScope	NNHH-65A-R4	Panel	700	30.00	2	250	70	10.75	713.10	4.6	107.00

ANT ID	Operator	Antenna Make	Antenna Model	Type	Freq (MHz)	TPO (Watts)	# of TX	Azimuth (°)	BW (°)	Gain (dBd)	Total ERP (Watts)	Length (ft.)	Antenna Z Value (ft.) AGL*
12	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	850	30.00	4	250	70	10.95	1493.42	4.6	107.00
12	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2300	18.00	4	250	63	16.05	2899.56	4.6	107.00
13	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	80	68	12.33	2736.02	6.0	129.00
14	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	80	66	12.62	2924.96	6.0	129.00
15	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	80	68	12.33	2736.02	6.0	129.00
16	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	80	66	12.62	2924.96	6.0	129.00
17	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	80	66	15.84	6139.32	6.0	129.00
18	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	80	63	16.39	6968.19	6.0	129.00
19	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	180	68	12.33	2736.02	6.0	120.00
20	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	180	66	12.62	2924.96	6.0	120.00
21	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	180	68	12.33	2736.02	6.0	120.00
22	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	180	66	12.62	2924.96	6.0	120.00
23	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	180	66	15.84	6139.32	6.0	120.00
24	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	180	63	16.39	6968.19	6.0	120.00
25	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	290	68	12.33	2736.02	6.0	129.00
26	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	290	66	12.62	2924.96	6.0	129.00
27	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	290	68	12.33	2736.02	6.0	129.00
28	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	290	66	12.62	2924.96	6.0	129.00
29	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	290	66	15.84	6139.32	6.0	129.00
30	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	290	63	16.39	6968.19	6.0	129.00
31	Unknown	GENERIC	MICROWAVE 2FT	Panel	18000	0.10	1	250	2.1	36.95	495.45	2.0	117.00

*Table 1: Total Site Data Table (*AGL = Above Ground Level)*

75% duty cycle is assumed for all AT&T antennas

C-Band antennas were calculated using AT&T's preferred conservative power reduction factor of 0.32

4.0 PREDICTED EMISSION LEVELS AND DISCUSSION

All calculations performed based upon the data listed for this facility have produced results that are above allowable limits for General Population and Occupational limits for exposure to RF emissions as specified by federal standards.

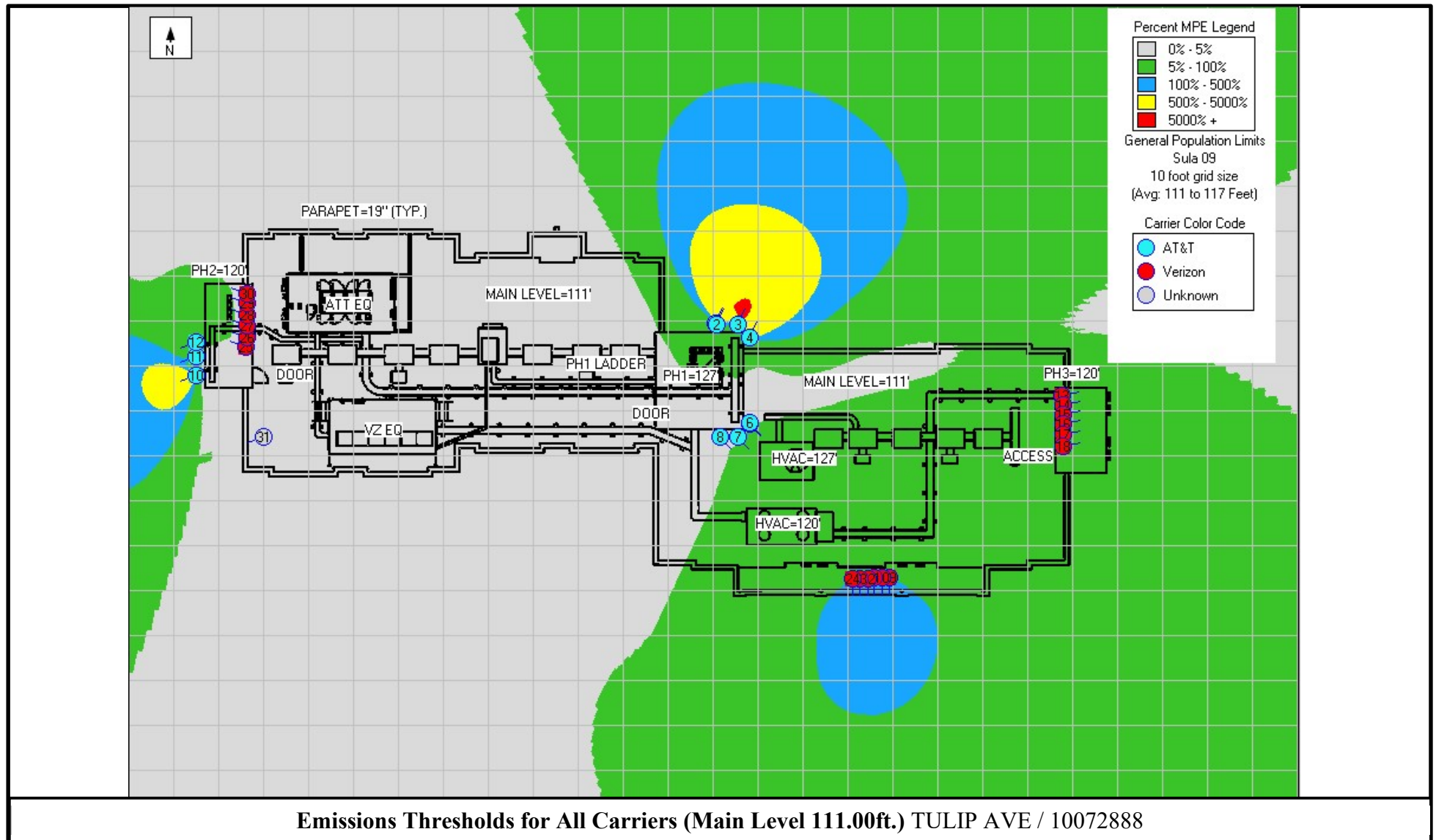
Maximum Predicted MPE Level on Site – AT&T Only:	% of MPE Limit:
Accessible General Population MPE Limits:	76.24%
Accessible Occupational MPE Limits:	15.25%

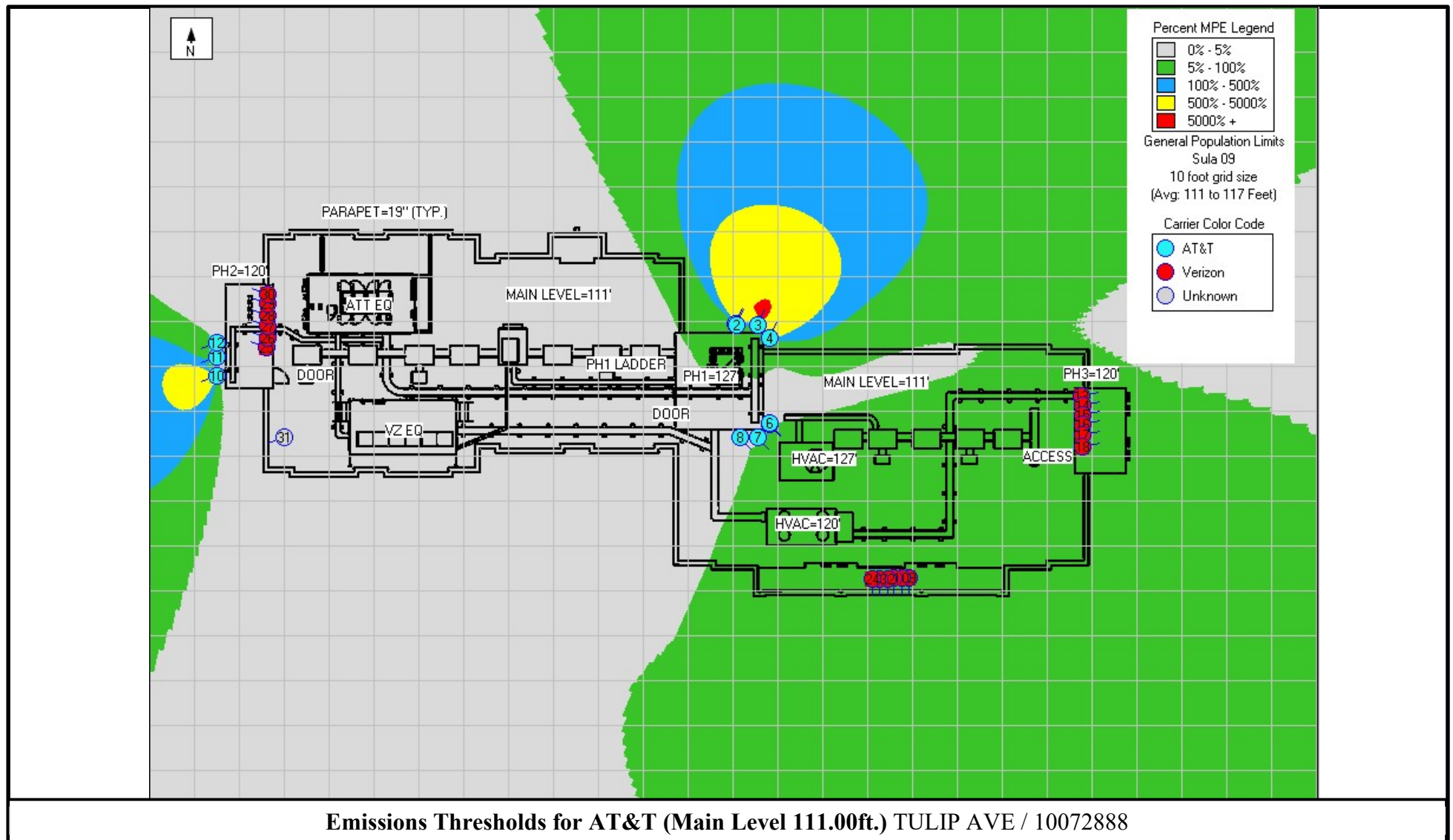
Maximum Composite Predicted MPE Level on Site – All Carriers:	% of MPE Limit:
Accessible General Population MPE Limits:	530.72%
Accessible Occupational MPE Limits:	106.14%

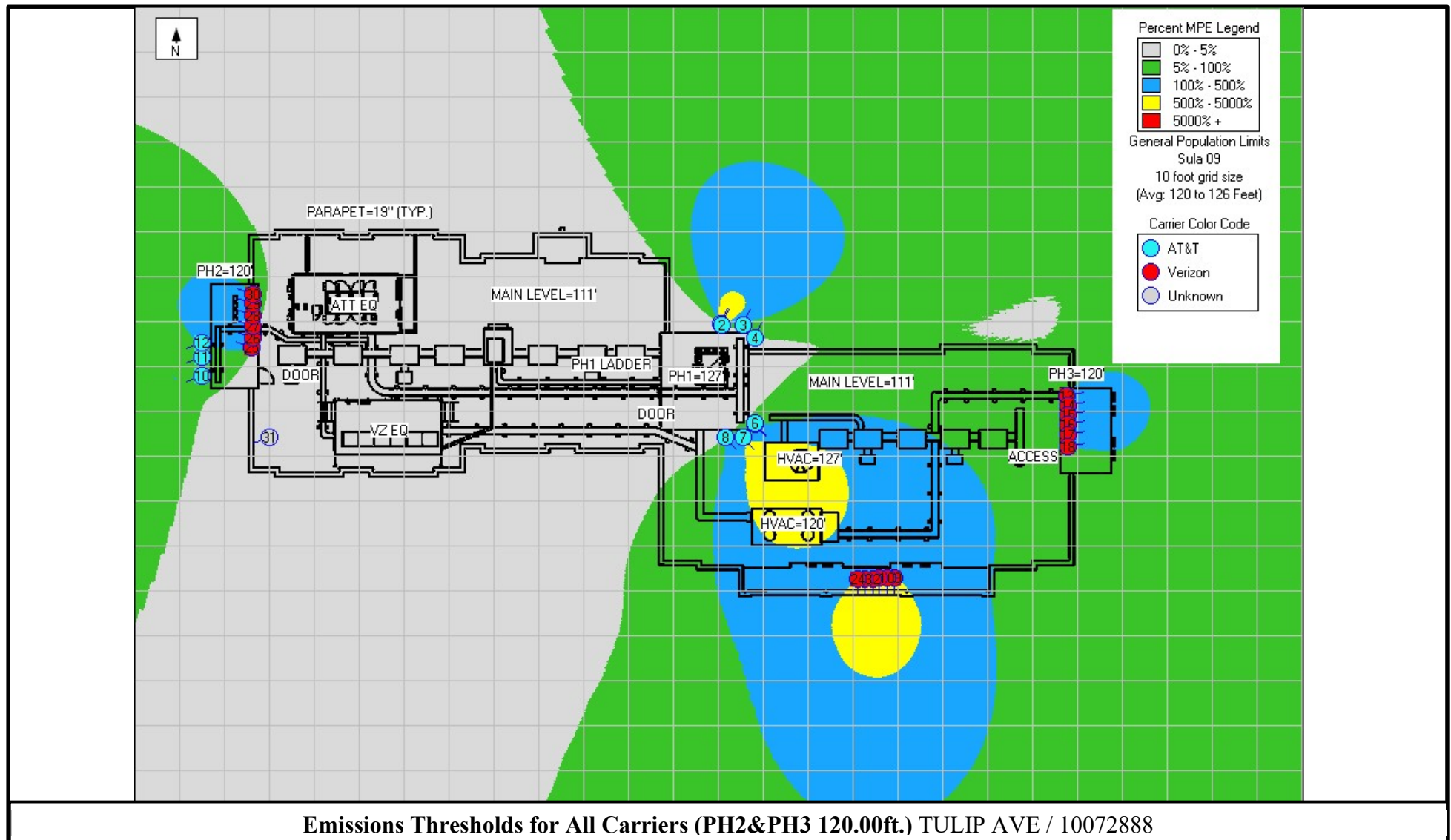
Maximum Predicted Ground Level MPE – AT&T Only:	% of MPE Limit:
Ground Level General Population MPE Limits:	0.91%
Ground Level Occupational MPE Limits:	0.18%

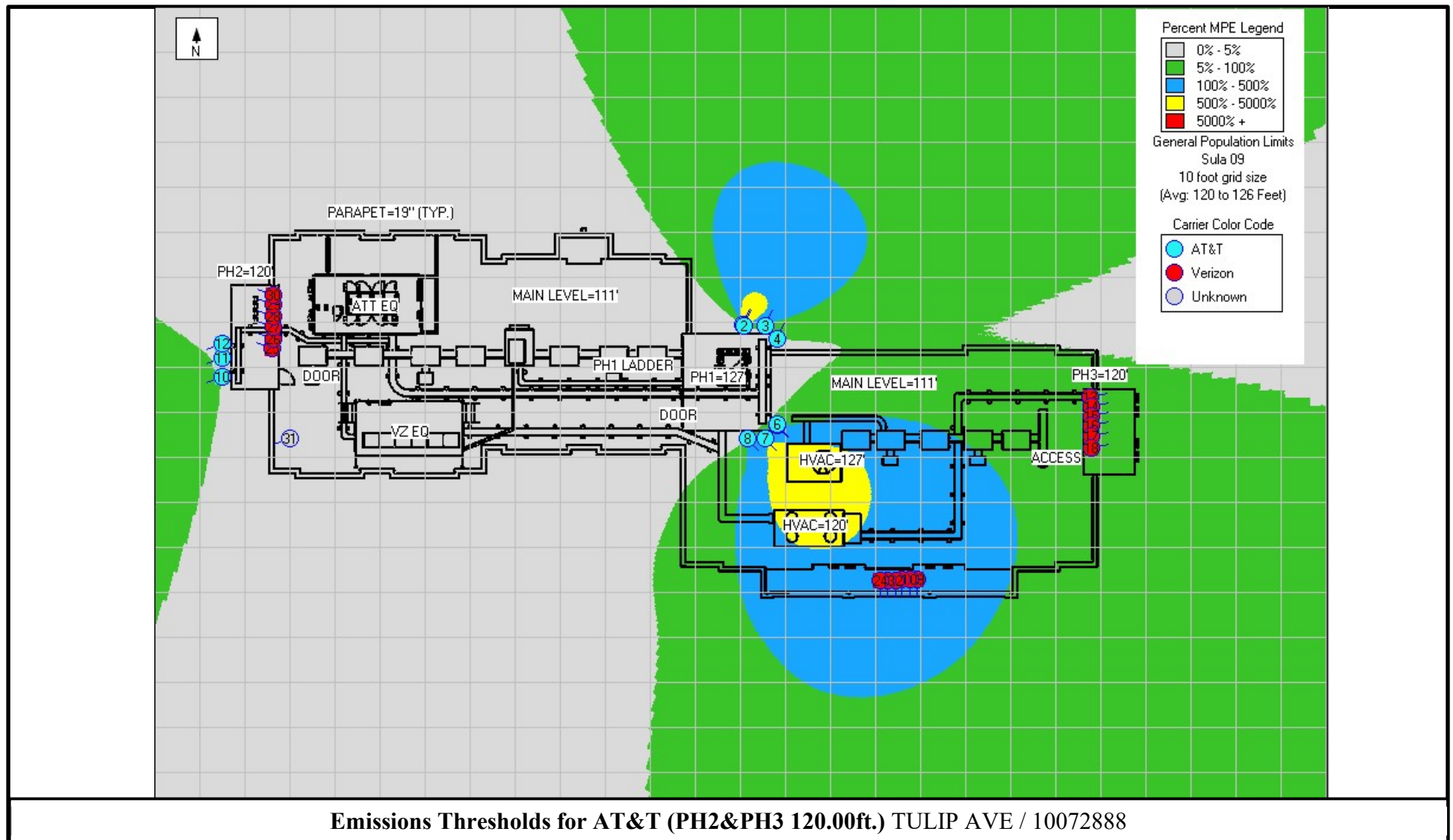
Maximum Predicted Ground Level MPE – All Carriers:	% of MPE Limit:
Ground Level General Population MPE Limits:	0.91%
Ground Level Occupational MPE Limits:	0.18%

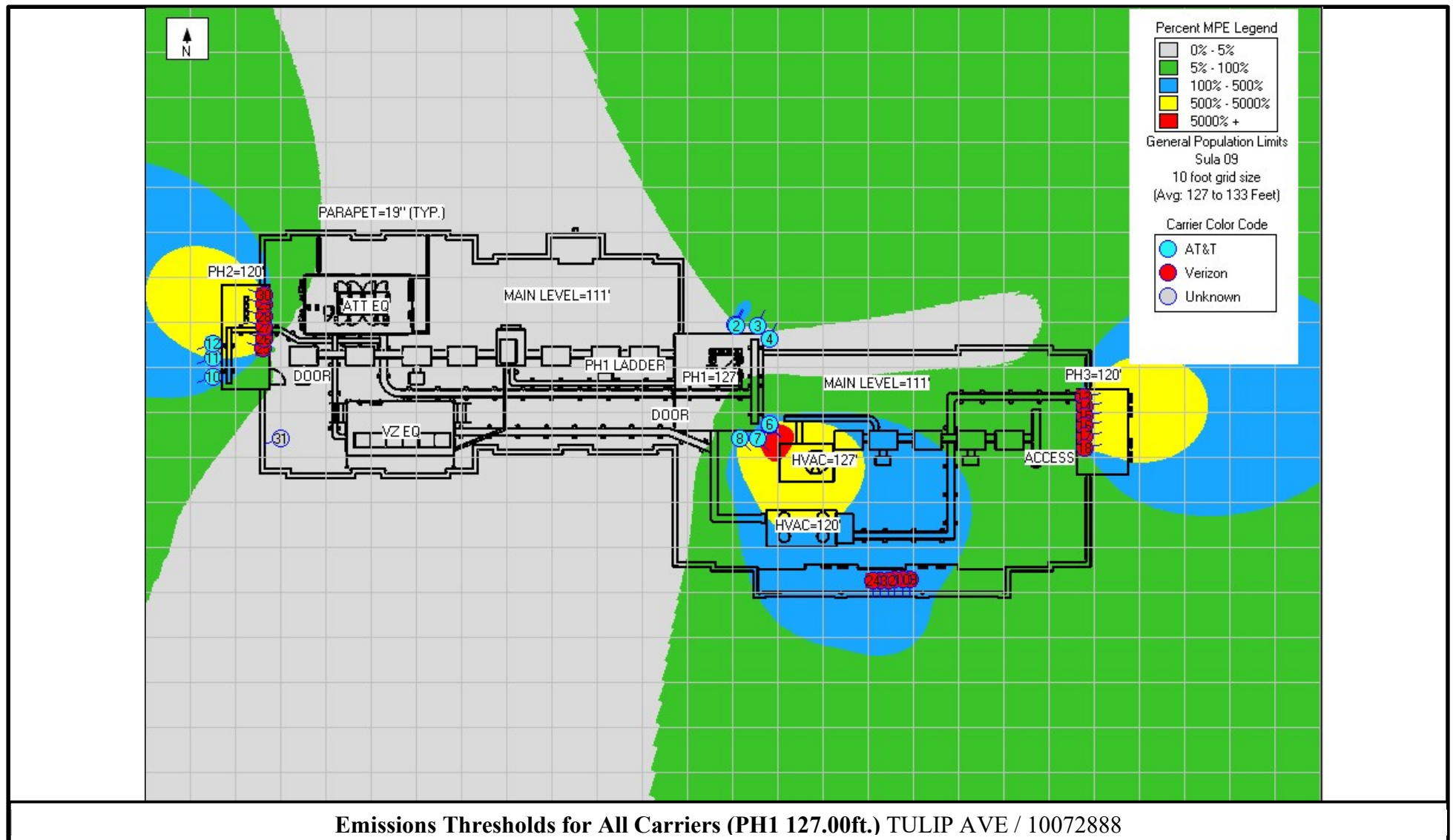
5.0 EMISSIONS DIAGRAMS

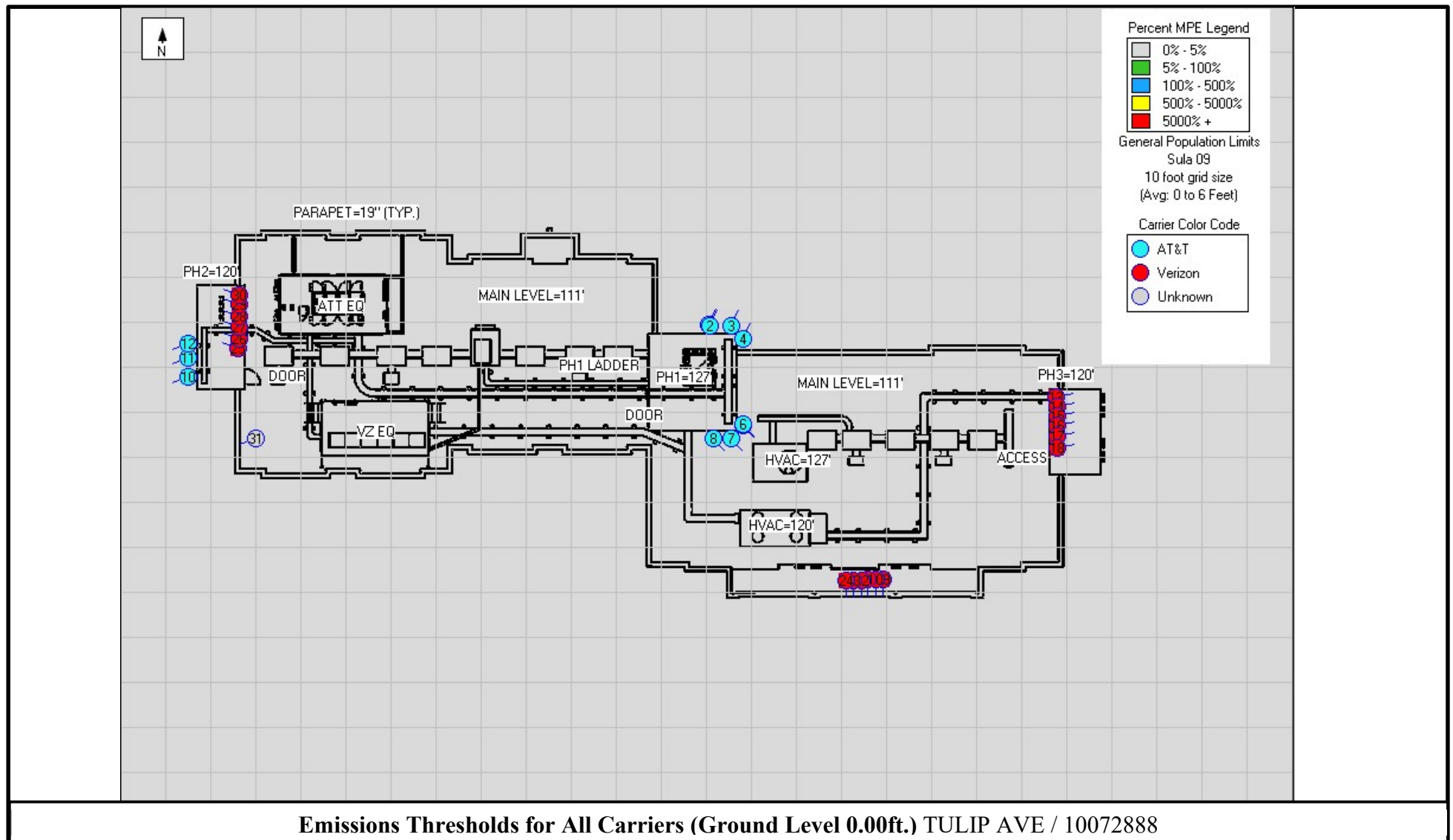












6.0 STATEMENT OF COMPLIANCE

Centerline conducted worst case modeling to determine whether the rooftop facility located at 7051 CARROL STREET in TAKOMA PARK, Maryland is in compliance with FCC Regulations.

6.1 STATEMENT OF AT&T MOBILITY COMPLIANCE

Based on the information analyzed, AT&T is in compliance with FCC Regulations. No additional action is required by AT&T.

6.2 RECOMMENDATIONS

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken							
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers	
PH Ladder	0	0	0	0	0	0	
Alpha	0	0	0	0	0	0	
Beta	0	0	0	0	0	0	
Gamma	0	0	0	0	0	0	

Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Alpha:

- No action needed.

Beta:

- No action needed.

Gamma:

- No action needed.

Notes:

- The existing Caution 2 sign on PH1 ladder is not required and can be removed.
- The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.
- The MPE limit is exceeded on top of the HVAC units in front of Beta sector. There are no fixed access points to these areas. Ensure any maintenance workers accessing the top of these units are trained in RF Safety procedures and wear personal RF monitoring equipment.

7.0 FALL ARREST AND PARAPET INFORMATION

As per AT&T barrier policy, rooftop edges that are protected with a 39-inch parapet wall or guardrail are safe for work activity within six (6) feet of the edge. OSHA has stated that an existing 39-inch guardrail or parapet provides sufficient protection for employees. The height of the top rail or equivalent component of guardrail systems in new construction shall be at least 42 inches above the walking or working surface. It should also be noted that the height of the parapet or guardrail may be reduced to no less than 30 inches at any point provided the sum of the depth (horizontal distance) of the top edge, and the height of the top edge (vertical distance from the work surface to the top edge of the top member, is at least 48 inches. If there is no reason for working atop the roof, then edge protection is not required. In addition, workers may use personnel lifts or temporary fall protection measures to perform work within 6 feet of the roof edge in place of permanent edge protection. Reference: 29 CFR 1910.28, 29 CFR 1910.23 (NPRM-1990); OSHA Letters of Interpretation 2/9/83 and 3/8/9

APPENDIX A: RF SIGNAGE**AT&T RF Signage**

Sign	Description	Sign	Description
	Information 1 Sign Gives guidelines on how to proceed and who to contact regarding areas that may exceed either the FCC's General Population or Occupational emissions limits.		Caution 2C Sign Gives specific information on how to proceed and who to contact regarding antennas that are façade mounted, concealed or on stand-alone structures.
	Blue Notice 1 Sign Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		Blue Notice 2 Sign Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limits. To be used on barriers or antenna sectors as a hybrid of the Information 1 and Blue Notice 1 signs.
	Yellow Caution 1 Sign-Rooftop Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		Yellow Caution 2 Sign-Rooftop Used to alert individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. To be used on barriers or antenna sectors as a hybrid of the Information 1 and Yellow Caution 1 signs.
	Yellow Caution 2B Sign- Tower Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limits. Must be placed at the base of the tower to warn tower climbers of potential for exposure.		Warning 2 Sign Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit by a factor of 10 or greater. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.

APPENDIX B: FCC GUIDELINES AND EMISSIONS THRESHOLD LIMITS

All power density values used in this report were analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General Population/Uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limit for the 700 and 800 MHz Bands is approximately 467 $\mu\text{W}/\text{cm}^2$ and 567 $\mu\text{W}/\text{cm}^2$ respectively, and the general population exposure limit for the 1900 MHz PCS and 2100 MHz AWS bands is 1000 $\mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure, have been properly trained in RF safety and can exercise control over their exposure. Occupational/Controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure, have been trained in RF safety and can exercise control over his or her exposure by leaving the area or by some other appropriate means. The Occupational/Controlled exposure limits all utilized frequency bands is five (5) times the FCC's General Public / Uncontrolled exposure limit.

The FCC Mandates that if a site is found to be out of compliance with regard to emissions that any system operator contributing 5% or more to areas exceeding the FCC's allowable limits will be responsible for bringing the site into compliance.

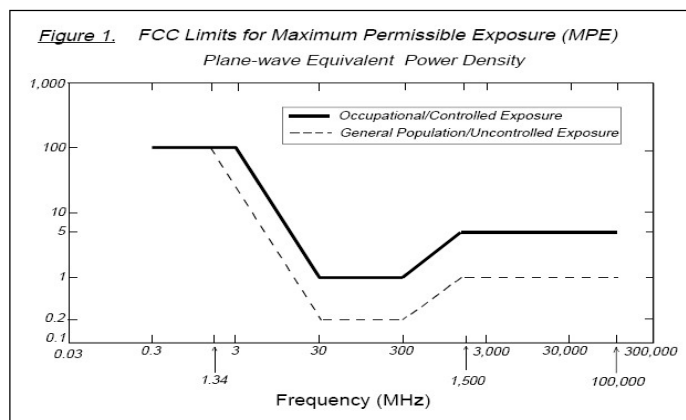
Additional details can be found in FCC OET 65.

Table 1: Limits for Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time [E]², [H]², or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm²)	Averaging Time [E]², [H]², or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

* Plane-wave equivalent power density



APPENDIX C: CALCULATION METHODOLOGY

Centerline Communications, LLC has performed theoretical modeling using Waterford Consultants' RoofMaster™ 2020 Version 35.05.18.22 which uses a cylindrical model for conservative power density predictions within the near field of the antenna where the antenna pattern has not truly formed yet. Within this area power density values tend to decrease based upon an inverse distance function. At the point where it is appropriate for modeling to change from near-field calculations to far-field calculations the power decreases inversely with the square of the distance. This modeling technique is accurate with low antenna centerlines, such as rooftops, where persons can get close to the antennas and pass through fields in close proximity.

The modeling is based on worst-case assumptions for the number of antennas and transmitter power. No losses were included in the power calculations unless they were specifically provided for the project.

FAR FIELD MODEL

In OET-65, a far field model is presented to calculate the spatial peak power density. The RoofMaster™ implementation of this model incorporates antenna manufacturer's horizontal and vertical pattern data to determine the power density in all directions. Power density is calculated as follows:

$$S = \frac{13.05 P_{in} G}{R^2} \frac{\mu W}{cm^2}$$

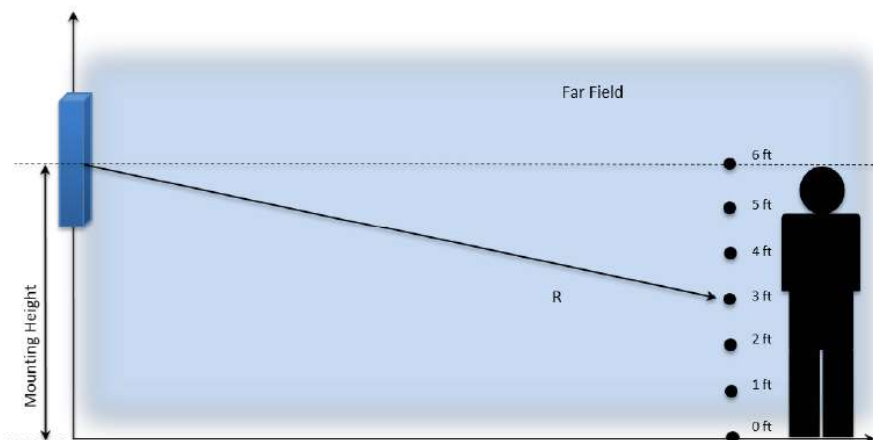
- Does not include 100% reflection factor
- Pin is Watts
- R is meters to study point
- G is gain to study point as specified in manufacturer horizontal and vertical patterns

A worst-case prediction is described in OET-65 where field strength may double due to 100% reflection of the incoming radiation. Considering an EPA recommendation that a multiplier of 1.6 is a more realistically representation of this effect is rewritten as follow:

$$S_{FF} = \frac{33.4 \cdot P_{in} \cdot G_{dBd}}{R^2} \quad (\mu W/cm^2)$$

This model yields the power density at a single point in space. In order to determine the spatial power density for comparison to the FCC limits, the average of several points calculated within the human profile (0 to 6 feet) must be conducted.

RoofMaster™ calculates seven power density values between 0 and 6 feet above the specified study plane and performs a linear spatial average.



Predicted power densities are displayed as a percentage of the applicable FCC standards.

Power Reduction Formula for Reducing Maximum Safety Distance Length

$$(\mathbf{R}_{\text{reduced}}/\mathbf{R}_{\text{max}}) = 0.99 * (\mathbf{P}_{\text{reduced}}/\mathbf{P}_{\text{max}})$$

$$\mathbf{P}_{\text{max}} = 200\text{W (Nominal Peak power of AEQK)}$$

$$\mathbf{R}_{\text{max}} = \text{Lateral Compliance Distance of AEQK}$$

$$\mathbf{P}_{\text{reduced}} = ?$$

$$\mathbf{R}_{\text{reduced}} = \text{Actual Lateral Distance between AEQK and Bldg. X}$$

APPENDIX D: CERTIFICATIONS

I, Zyotty Thamsil, preparer of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T's RF Exposure: Responsibilities, Procedures & Guidelines document.

Zyotty Thamsil

10/19/2022

I, Yasir Alqadhili, reviewer and approver of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T's RF Exposure: Responsibilities, Procedures & Guidelines document.

Yasir Alqadhili

10/19/2022

APPENDIX E: PROPRIETARY STATEMENT

This report was prepared for the use of AT&T Mobility, LLC to meet requirements specified in AT&T's corporate RF safety guidelines. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by Centerline Communications, LLC are based solely on the information provided by AT&T Mobility and all observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to Centerline Communications, LLC so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

PROJECT DESCRIPTION

AT&T WIRELESS PROPOSES TO MODIFY AN EXISTING WIRELESS INSTALLATION. THE SCOPE WILL CONSIST OF THE FOLLOWING:

ROOFTOP SOW

- DECOM (4) EXISTING 1-5/8" COAX AND LEAVE IN-PLACE
- DECOM (2) EXISTING 7/8" COAX AND LEAVE IN-PLACE
- REMOVE (3) EXISTING KATHREIN 742 264 ANTENNAS
- REMOVE (E) TMAS/DIPLEXERS IN POS. 1
- USE EXISTING SPARE 6 AWG DC TRUNKS

- INSTALL (3) PROPOSED AEQK ANTENNAS IN POS. 1
- INSTALL (3) PROPOSED AEQU ANTENNAS IN POS. 1

GROUND SOW

- DECOM EXISTING UMTS
- REMOVE EXISTING 9412 CABINET
- RELOCATE EVERYTHING INSIDE THE EXISTING 9412 CABINET TO THE PROPOSED FLX21-V2 CABINET

- INSTALL (1) PROPOSED 48V RECTIFIER IN (E) NETSURE 7100 PP
- INSTALL (4) PROPOSED DEKA FAHRENHEIT HT170ET BATTERIES
- INSTALL (1) PROPOSED FLX21-V2 CABINET
- INSTALL (1) PROPOSED FSM4 INSIDE PROPOSED FLX21-V2 CABINET
- INSTALL (1) PROPOSED 100A BREAKER
- INSTALL (6) PROPOSED 40A BREAKERS
- INSTALL (2) PROPOSED 30A BREAKERS

- NO SITE/CIVIL WORK

ROOFTOP SOW

- INSTALL (3) PROPOSED AEQK ANTENNAS IN POS. 1
- INSTALL (3) PROPOSED AEQU ANTENNAS IN POS. 1

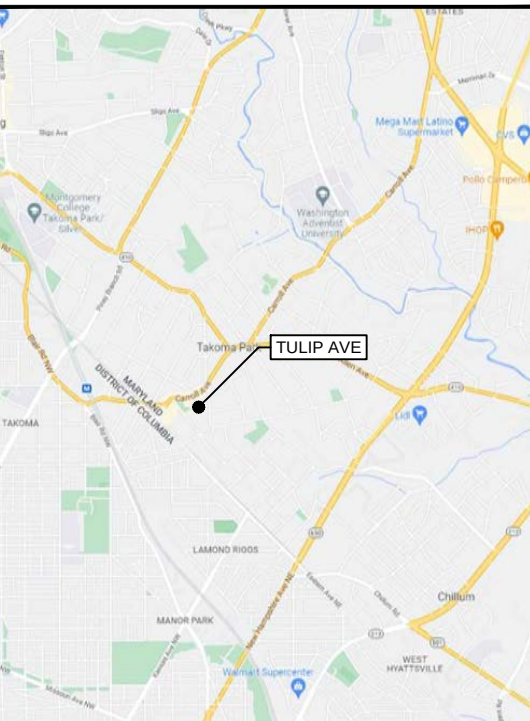
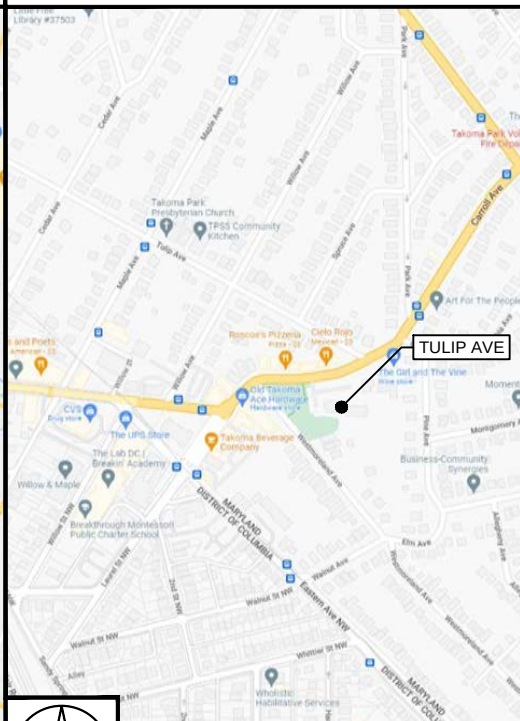
- DECOM EXISTING UMTS
- REMOVE EXISTING 9412 CABINET
- RELOCATE EVERYTHING INSIDE THE EXISTING 9412 CABINET TO THE PROPOSED FLX21-V2 CABINET

- NO SITE/CIVIL WORK

SITE INFORMATION	
LANDLORD:	TAKOMA TOWER LP
LANDLORD SITE NUMBER:	N/A
SITE NAME:	TULIP AVE
USID NUMBER:	3939
FA NUMBER:	10072888
SITE ADDRESS:	7051 CARROL STREET TAKOMA PARK, MD 20912
COUNTY:	MONTGOMERY
LATITUDE (NAD 83):	N 38° 58' 29.089" (38.974747)
LONGITUDE (NAD 83):	W 77° 00' 37.573" (-77.010437)
RAD CENTER:	107', 115' & 129' AGL
SITE ACQUISITION CONTACT:	ANDREW CAPACI Andrew.Capaci@jacobs.com
RF ENGINEER:	SANDEEP GUPTA AA913P@att.com
C&E MANAGER:	STEVEN SAFIRE SS0091@att.com
JURISDICTION:	MONTGOMERY COUNTY
APPLICANT/LESSEE:	AT&T 7150 STANDARD DRIVE SUITE A HANOVER, MD 21076

CONTACT INFORMATION	
ENGINEER:	JACOBS TELECOMMUNICATIONS, INC. 7150 STANDARD DRIVE, SUITE B HANOVER, MD 21076
CONTACT:	LEAH WOOLLY
PHONE:	443.230.4400x113

LOCATION MAPS

VICINITY MAP	LOCAL MAP
	

NO SCALE

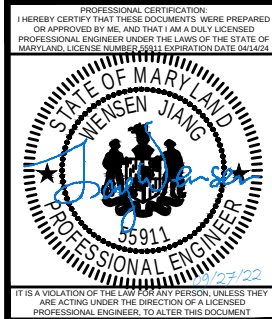
DRIVING DIRECTIONS

DIRECTIONS FROM AT&T OFFICE: START OUT FROM 7150 STANDARD DR, HANOVER MD HEAD SOUTHWEST TOWARD STANDARD DR. TURN LEFT TOWARD STANDARD DR. TURN RIGHT ONTO STANDARD DR. TURN LEFT ONTO PARKWAY DR. TURN RIGHT ONTO PARK CIR DR. TURN LEFT ONTO COCA COLA DR. SLIGHT RIGHT TO MERGE ONTO MD-100 W TOWARD ELLICOTT CITY MERGE ONTO MD-100 W TAKE THE EXIT ONTO I-95 S TOWARD WASHINGTON TAKE EXIT 27 W TO MERGE ONTO I-495 W TOWARD SILVER SPRING TAKE EXIT 28B TO MERGE ONTO MD-650 S/NEW HAMPSHIRE AVE TOWARD TAKOMA PARK MERGE ONTO MD-650 S/NEW HAMPSHIRE AVE. SLIGHT RIGHT TOWARD MD-320 S/PINEY BRANCH RD. MERGE ONTO MD-320 S/PINEY BRANCH RD. TURN LEFT ONTO CARROLL AVE. TURN LEFT,TURN LEFT DESTINATION WILL BE ON THE RIGHT.

T-1



- NOTES:**
1. PLAN BASED ON AS-BUILT DRAWINGS ISSUED BY B+T GRP ON 08/12/2021.
CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND
LOCATION/ORIENTATION OF EXISTING EQUIPMENT.
 2. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER
AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.



APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

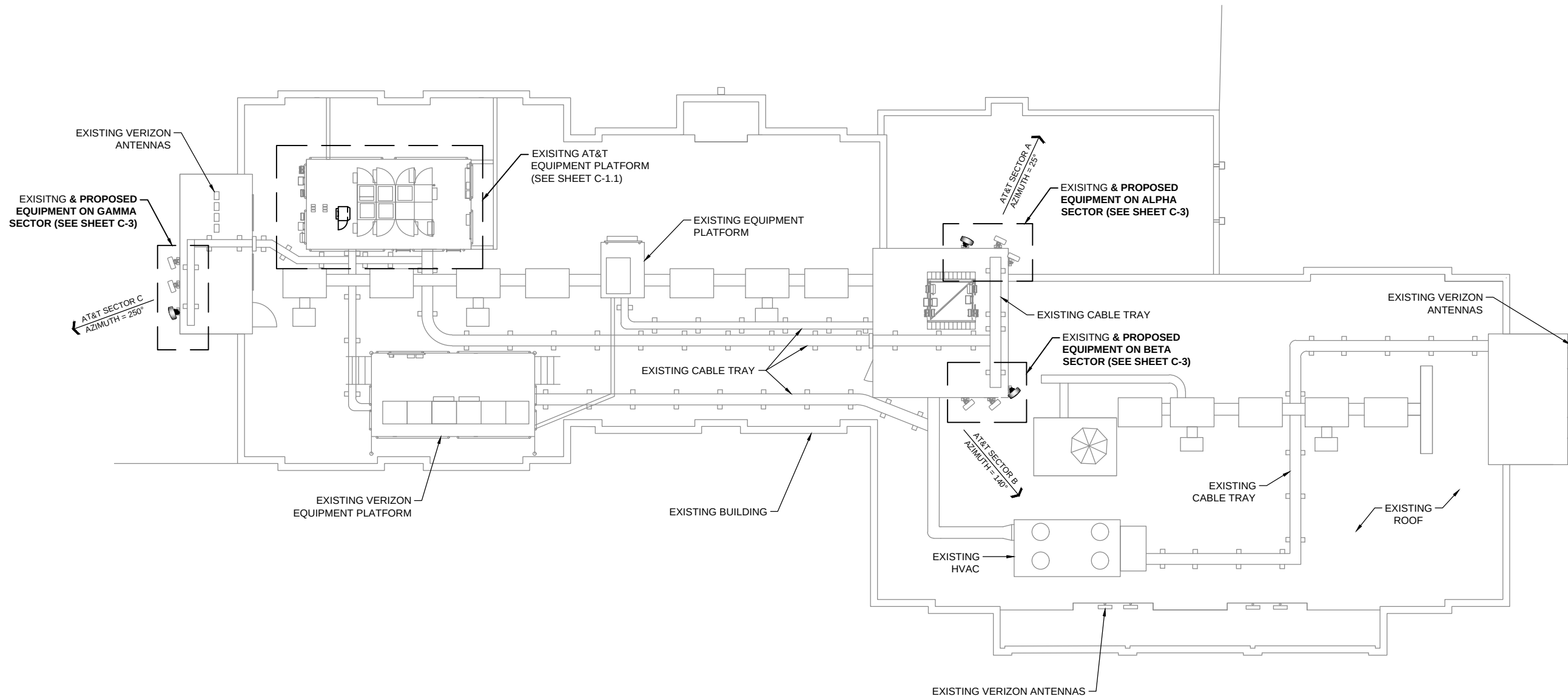
SUBMITTALS			
3	09/27/22	JX COMMENTS	
2	08/23/22	ISSUED	
1	06/13/22	REVISION	
0	06/01/22	ISSUED	
B	06/01/22	REVISION	
A	04/27/22	ISSUED FOR REVIEW	

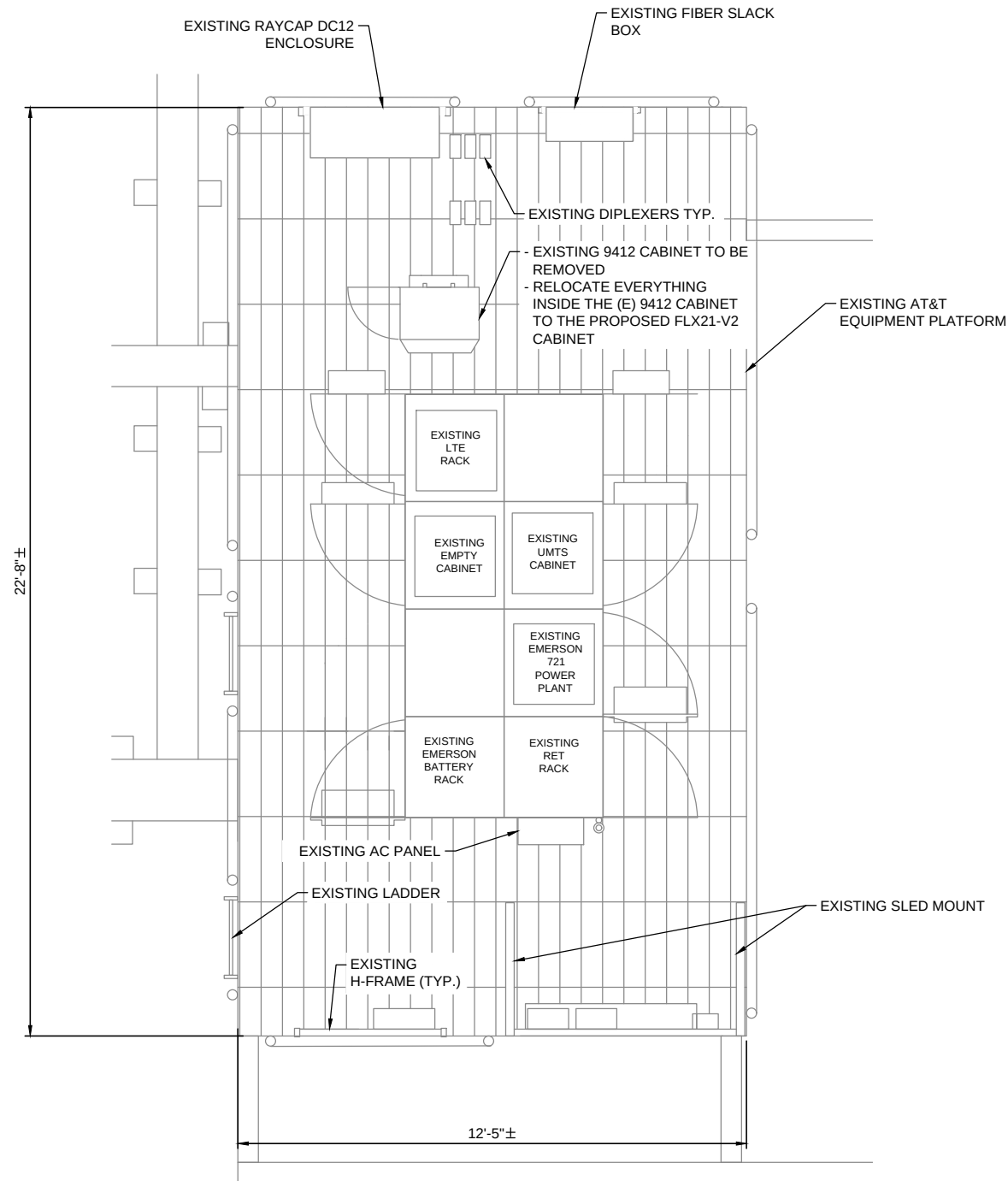
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USID# 3939
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7051 CARROL STREET
TAKOMA PARK, MD 20912

ROOFTOP PLAN

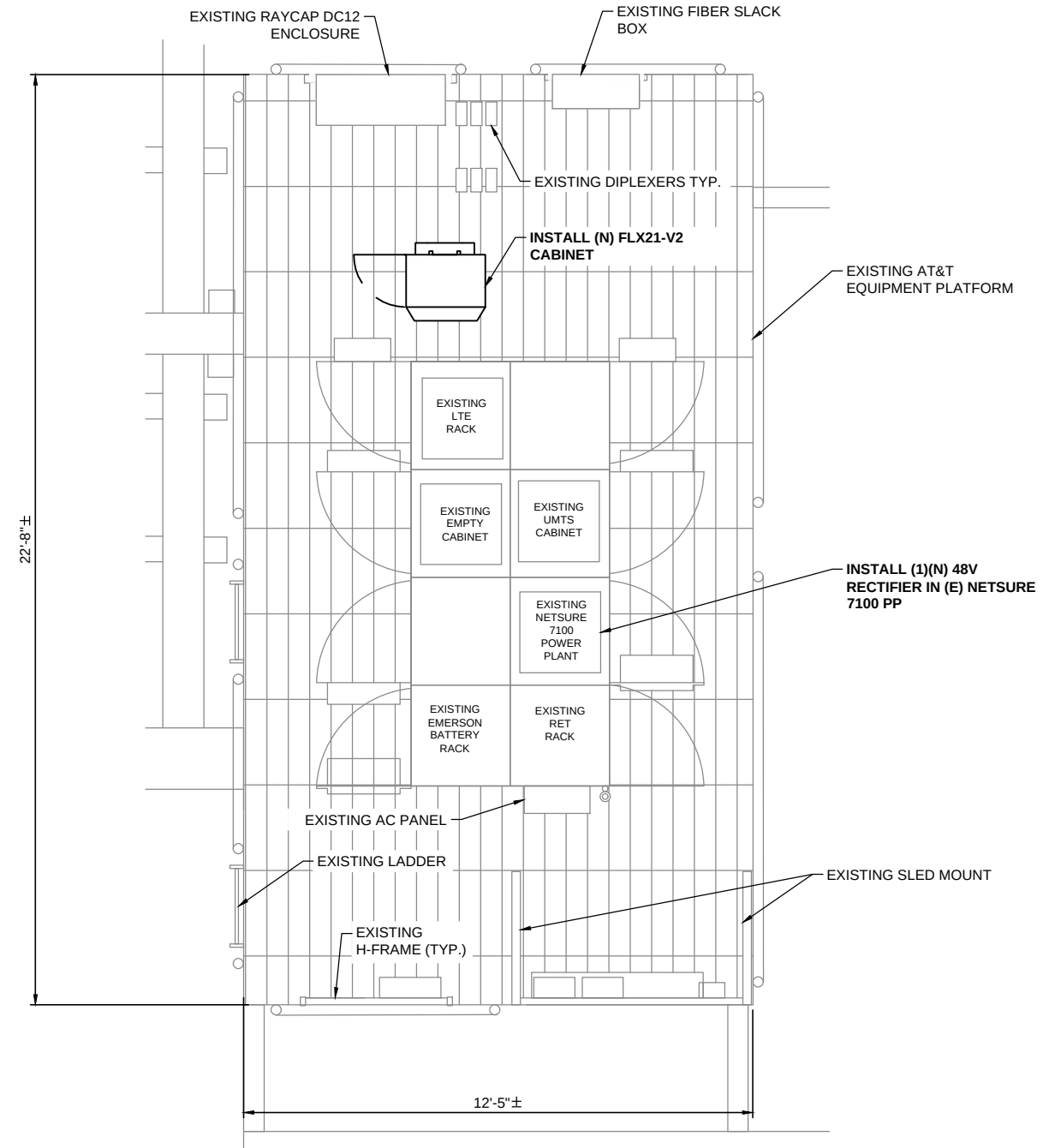
C-1





GROUND SCOPE OF WORK:

- DECOM (E) UMTS
- REMOVE (E) 9412 CABINET
- INSTALL (1)(N) 48V RECTIFIER IN (E) NETSURE 7100 PP
- INSTALL (4)(N) DEKA FAHRENHEIT HT170ET BATTERIES IN (E) BATTERY RACK
- INSTALL (N) FLX21-V2 CABINET
- RELOCATE EVERYTHING INSIDE THE (E) 9412 CABINET TO THE (N) FLX21-V2 CABINET
- INSTALL (N) FSM4 INSIDE (N) FLX21-V2 CABINET
- INSTALL (1)(N) 100A BREAKER FOR (N) FLX21-V2 CABINET
- INSTALL (3)(N) 40A BREAKERS FOR (N) AEQK
- INSTALL (3)(N) 40A BREAKERS FOR (N) AEQU
- INSTALL (2)(N) 30A BREAKERS FOR (E) FSM4 CHASSIS (CBAND)

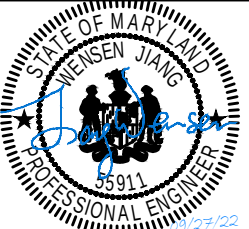


Jacobs

Challenging today.
Reinventing tomorrow.

Jacobs Telecommunications, Inc.
7150 STANDARD DR. SUITE B
HANOVER, MD 21076
443.230.4400x113

PROFESSIONAL CERTIFICATION:
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED
OR APPROVED BY ME, AND THAT I AM A D&V LICENSED
PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF
MARYLAND. LICENSE NUMBER: 55911 EXPIRATION DATE: 06/30/24



IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS THEY
ARE ACTING UNDER THE DIRECTION OF A LICENSED
PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT

APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS

3	09/27/22	JX COMMENTS
2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
B	06/01/22	REVISION
A	04/27/22	ISSUED FOR REVIEW

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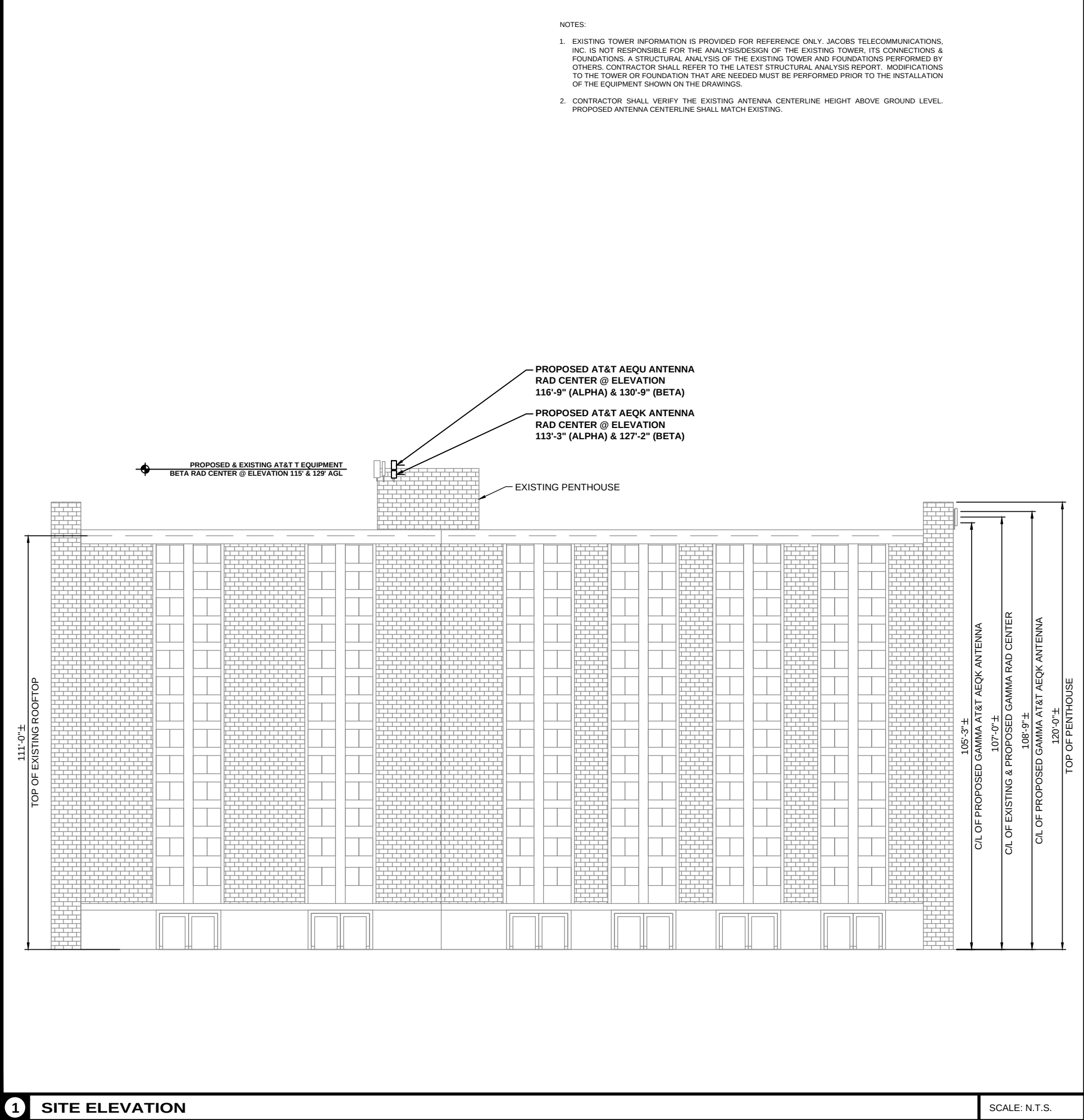
USID# 3939

TULIP AVE

7051 CARROL STREET
TAKOMA PARK, MD 20912

GROUND EQUIPMENT LAYOUT

C-1.1



NOTES:

1. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUNDING KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.

A. GROUNDING AT THE ANTENNA LEVEL.

B. GROUNDING AT MID LEVEL, TOWERS WHICH ARE OVER 200', ADDITIONAL CABLE ROUNDING REQUIRED.

C. GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.

D. GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.

E. GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.

2. ALL PROPOSED GROUNDING BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUNDING BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUNDING BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.

3. THE CONTRACTORS SHALL BE RESPONSIBLE FOR VERIFYING THE ANTENNA AND THE COAX CONFIGURATION IS THE CORRECT MAKE AND MODELS, PRIOR TO INSTALLATION.

4. ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A SECTOR ANTENNA MOUNT, INCLUDING ALL HARDWARE, WHEN APPLICABLE.

5. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS.

6. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.

ANTENNA MOUNTING NOTES:

1. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/EIA/TIA-222 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES" OR APPLICABLE LOCAL CODES. DESIGN WIND LOADING OBTAINED FROM ANSI/TIA-222-G, OR THE LATEST VERSION.

2. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.

3. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.

4. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.

5. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.

6. ANTENNA CONTRACTOR SHALL ENSURE ALL ANTENNA MOUNTING PIPES ARE PLUMB AND LEVEL.

7. MULTI PORT ANTENNAS: TERMINATE UNUSED ANTENNA PORTS WITH CONNECTOR CAP & WEATHERPROOF THOROUGHLY. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.

8. CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE DOCUMENTATION TO AT&T.

9. CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.

COAXIAL ANTENNA CABLE NOTES:

1. TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.

2. CONTRACTOR SHALL VERIFY THE DOWN-TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.

3. CONTRACTOR TO CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027, REFER TO THE LATEST VERSION.

4. ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE WILL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".

5. ALL COAXIAL CABLE WILL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" O.C.

6. CONTRACTOR MUST FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.

7. WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS.

8. CONTRACTOR SHALL GROUND ALL EQUIPMENT. INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.

9. CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

FIBER & POWER CABLE MOUNTING NOTES:

1. CABLE TO BE SUPPORTED USING 1/2" SNAP-INS (PIM RATED)(SNAPTEK POLYMERS OR EQUIVALENT) OR 1/2" BUTTERFLY HANGERS (PIM RATED)(SNAPTEK POLYMERS OR EQUIVALENT) OR ENGINEER APPROVED EQUAL..

2. CABLE TO BE SUPPORTED EVERY 3'.

3. ALL SNAP-INS, RUBBER CABLE INSERTS, AND MOUNTING HARDWARE FOR FIBER AND DC CABLES SHALL BE SUPPLIED FROM ROSENBERGER.

4. RRUS TO BE INSTALLED WITHIN 16.4' (5.0 METERS) OF THE SURGE SUPPRESSOR. (CONTRACTOR TO FIELD VERIFY).

TORQUE REQUIREMENTS:

1. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.

2. ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.

A. RF CONNECTION BOTH SIDES OF THE CONNECTOR.

B. GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.

3. ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).

4. ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).

5. ALL GROUNDING HARDWARE SHALL TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUND IS NO LONGER LOOSE.

6. ALL DIN TYPE CONNECTIONS ARE TO BE TORQUED TO 18-22 LB-FT (24.4 - 29.8 NM).

7. ALL N TYPE CONNECTIONS ARE TO BE TORQUED TO 15-20 LB-IN (1.7 - 2.3 NM).



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R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

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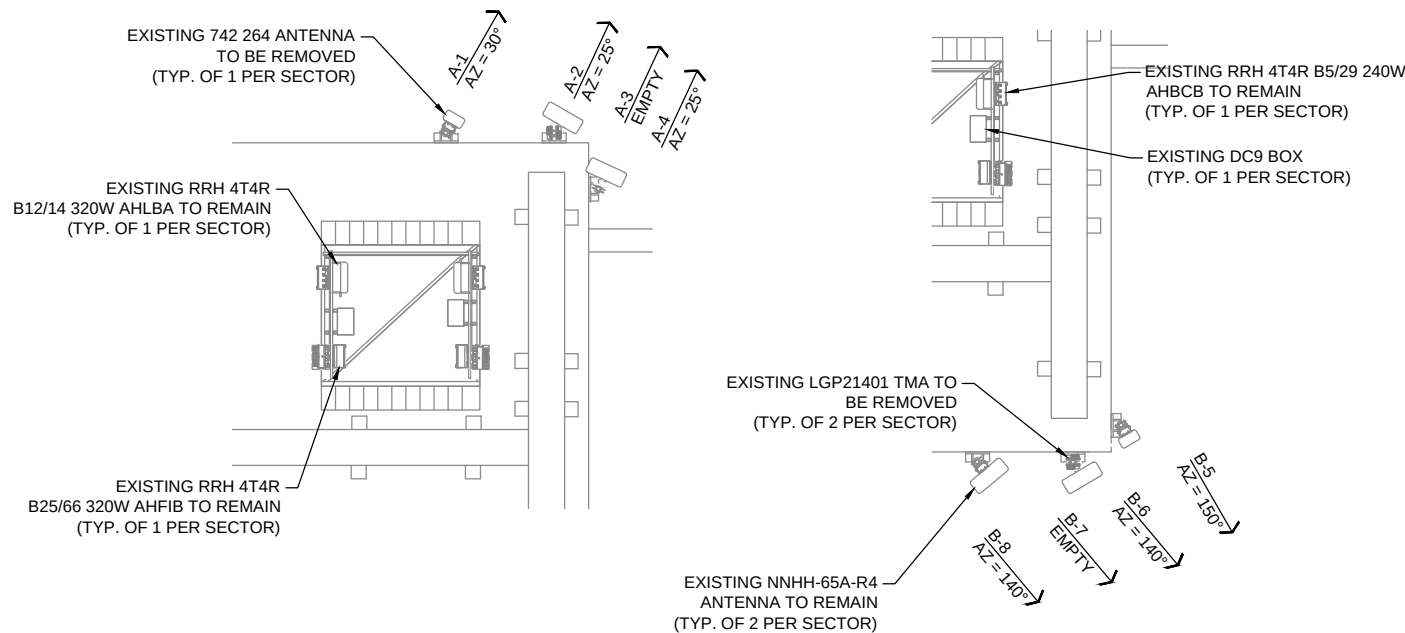
3	09/27/22	JX COMMENTS
2	08/23/22	ISSUED
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SITE ELEVATION

C-2

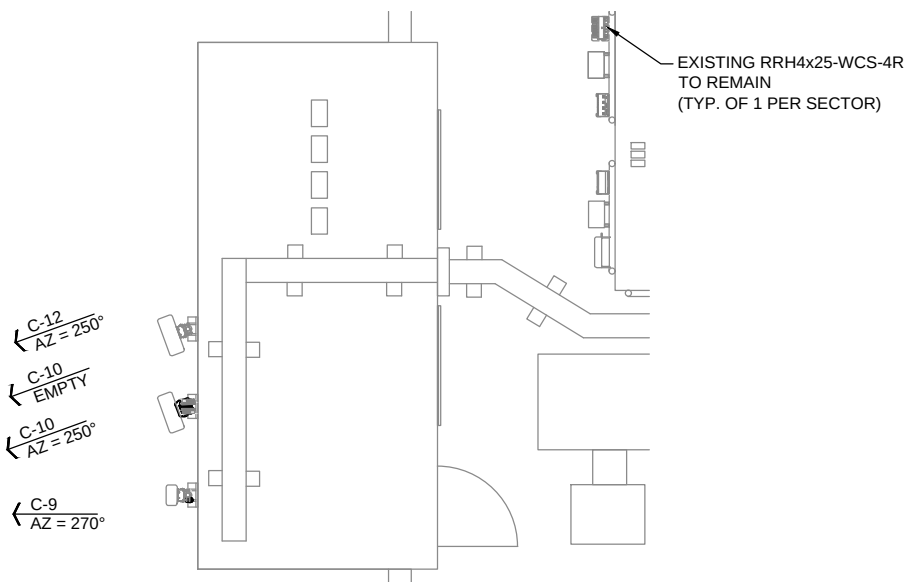


ELEVATION 115'

ELEVATION 129'

NOTES:

- CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
- CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.
- CONTRACTOR SHALL REFER TO THE TOWER EQUIPMENT INSTALLATION MOUNT STRUCTURAL ANALYSIS REPORT; SITE NUMBER: N/A; SITE NAME: TULIP AVE; FA LOCATION: 10072888 ; ISSUED BY JACOBS TELECOMMUNICATIONS, INC. ON XX/XX/XX. PER THIS ANALYSIS NO MODIFICATIONS ARE REQUIRED FOR THE PROPOSED EQUIPMENT. CONTRACTOR SHALL CONFIRM ALL MOUNT MEMBERS AND PROPOSED APPURTENANCES ARE INSTALLED IN ACCORDANCE WITH THIS REPORT.



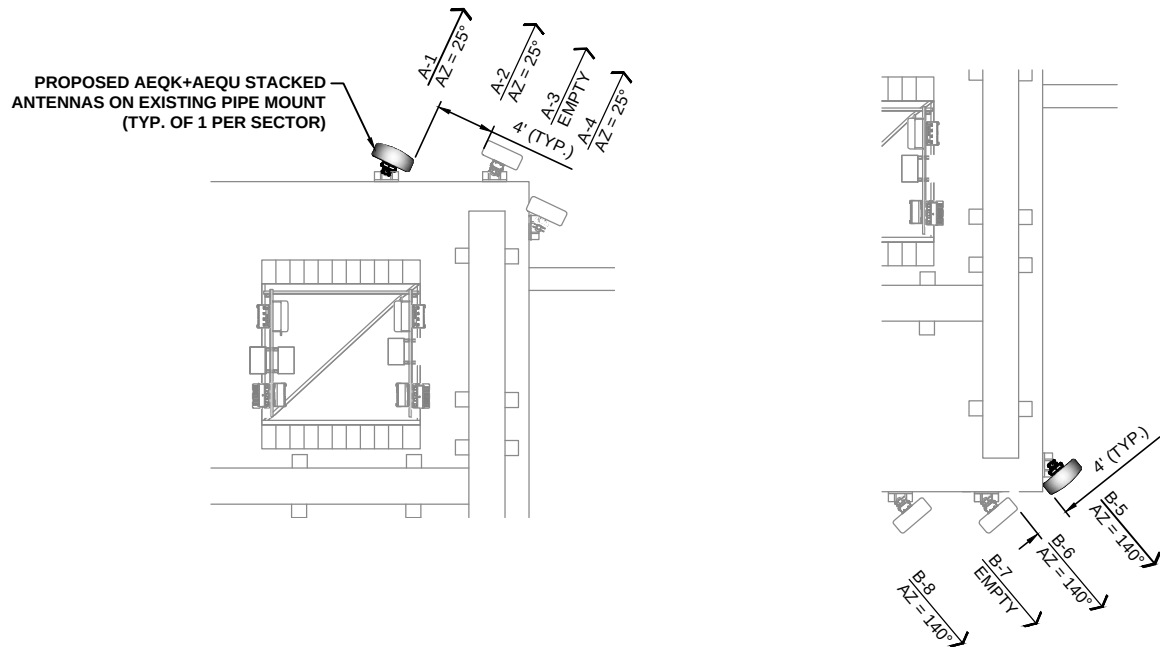
ELEVATION 107'

1 EXISTING ANTENNA LAYOUT

SCALE: 1/4" = 1'-0"



NOTE: ALL NEW ANTENNAS WILL BE PAINTED TO MATCH.

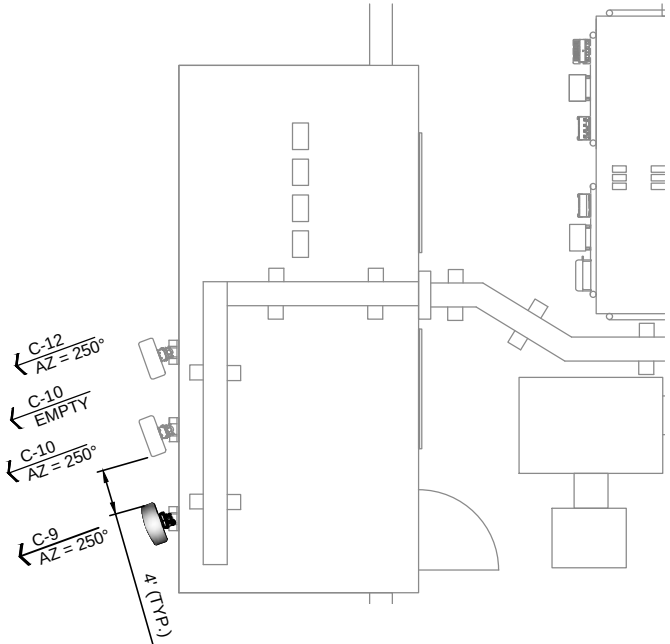


ELEVATION 115'

ELEVATION 129'

TOWER SCOPE OF WORK:

- DECOM (4)(E) 1-5/8" COAX AND LEAVE IN-PLACE
- DECOM (2)(E) 7/8" COAX AND LEAVE IN-PLACE
- REMOVE (E) KATHREIN 742 264 ANTENNA IN POS 1 (ALL SECTORS)
- REMOVE (E) TMAS/DIPLEXERS IN POS 1 (ALL SECTORS)
- INSTALL (N) AEQK IN POS 1 (1 PER SECTOR)
- INSTALL (N) AEQU STACKED ON TOP OF AEQK IN POS 1 (1 PER SECTOR)
- USE (E) SPARE 6 AWG DC TRUNKS FOR (N) AEQK AND (N) AEQU



ELEVATION 107'

2 PROPOSED ANTENNA LAYOUT

SCALE: 1/4" = 1'-0"



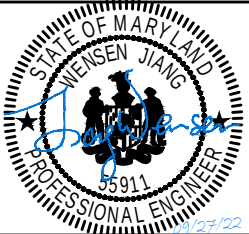
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ZONING _____

CONSTRUCTION _____

A & E _____

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SUBMITTALS

3	09/27/22	JX COMMENTS
2	08/23/22	ISSUED
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TULIP AVE

7051 CARROL STREET
TAKOMA PARK, MD 20912

EXISTING & PROPOSED
ANTENNA LAYOUT

C-3

MANUFACTURER:
MODEL NO.:
TECHNOLOGY:
DIMENSIONS (HxWxD):
WEIGHT (lbs):
POWER SUPPLY:
TEMP. W/O SOLAR LOAD:

NOKIA
AEQK AIRSCALE MAA 64T64R 192AE n77 200w
5G CBAND
29.53" x 17.72" x 9.53"
<99.21
DC -40.5V TO -57V
-40°C TO 55°C

NOTE: ALL NEW ANTENNAS
WILL BE PAINTED TO MATCH.

17.72"

29.53"

9.53"

MANUFACTURER:
MODEL NO.:
TECHNOLOGY:
DIMENSIONS (HxWxD):
WEIGHT (lbs):
POWER SUPPLY:
TEMP. W/O SOLAR LOAD:

NOKIA
AEQU AIRSCALE MAA 64T64R 192AE n77 200w
5G DOD
29.53" x 17.72" x 9.45"
<99.21
DC -40.5V TO -57V
-40°C TO 55°C

NOTE: ALL NEW ANTENNAS
WILL BE PAINTED TO MATCH.

17.72"

29.53"

9.45"

NOTE:
INCLUDED PRODUCTS WITH
ANTENNA PURCHASE

ANTENNA
MOUNTING PIPE

NOKIA AEQU ANTENNA

12"

NOKIA AEQK ANTENNA

1

AEQK AIRSCALE MAA 64T64R 192AE n77 200w

SCALE: NTS

2

AEQU AIRSCALE MAA 64T64R 192AE n77 200w

SCALE: NTS

3

CBAND MOUNTING DETAIL

SCALE: NTS

EQUIPMENT BAY

DEMARC BOX OPTION

20"

24"

EQUIPMENT RAIL

FRONT DOOR

BATTERY PEDESTAL
OPTION

4

FLEX21-V2 CABINET

SCALE: NTS

5

DETAIL NOT USED

SCALE: NTS

6

DETAIL NOT USED

SCALE: NTS

7

DETAIL NOT USED

SCALE: NTS

8

DETAIL NOT USED

SCALE: NTS

9

DETAIL NOT USED

SCALE: NTS

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STATE OF MARYLAND

WENSEN JIANG

55911

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SITE DETAILS

C-4



Signage and barriers are the primary means of mitigating access to accessible areas of exposure. Below is a summary of existing and recommended signage at this AT&T facility.

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken						
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0
Alpha	0	0	0	0	0	0
Beta	0	12	0	0	0	X
Gamma	0	0	0	0	0	0

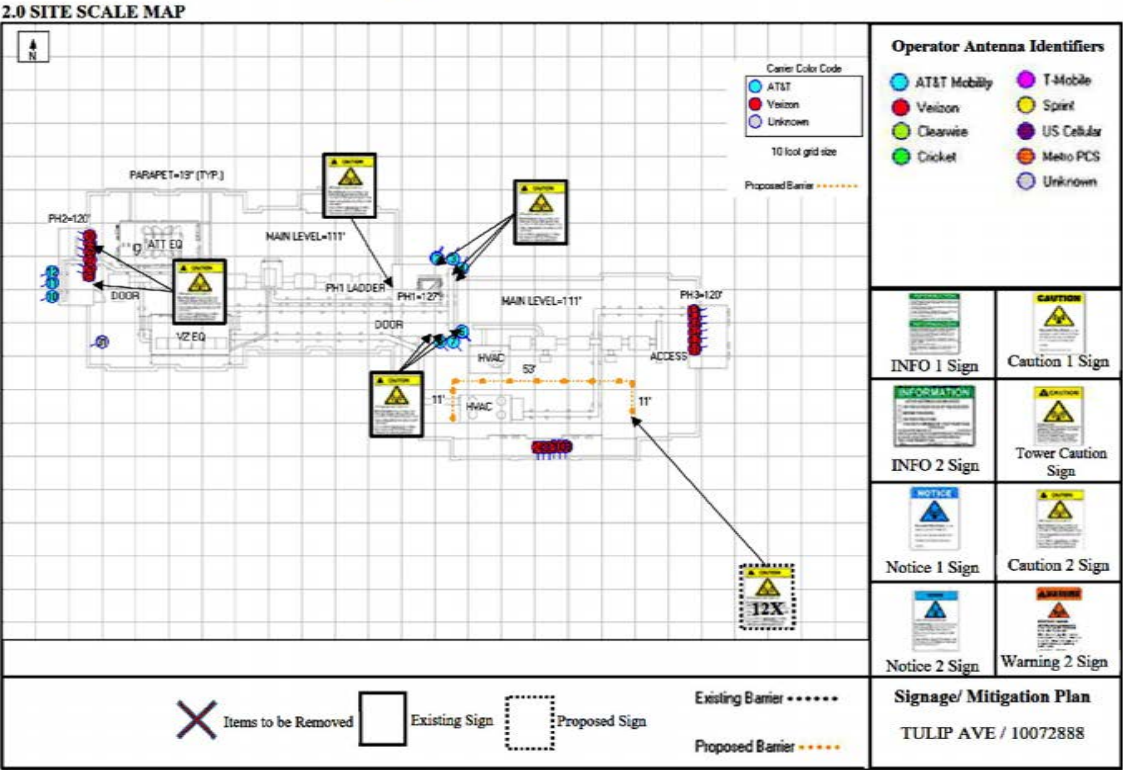
Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	15	0	0	0	0	X
Gamma	0	0	0	0	2	0	0	0	0	0

Beta:

- Install a 75' barrier (11'x53'x11' segments) with an estimated (12) stanchions. Install (12) Caution 2 signs on the barrier.

Notes:

- Ensure all barriers are at least 6' away from any unprotected roof edges.
- The existing Caution 2 sign on PH1 ladder is not required and can be removed.
- The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.



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CONSTRUCTION _____

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PROJECT NO: EP4TURWL

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RF SIGNAGE AND MITIGATION

C-5

Model	NetSure 7217/100-15211-200 w/26-position Panels		
Number of Radio Types	2	No.	Fixed Generator Onsite
Radio Type #1:	Converters per trunk feed: 0		
Select Installation type	Unstacked	Stacked	
Trunk Cable Length - one-way	360 ft		
Trunk Cable Size (AWG - 4, 6, 8)	6		
Jumper Cable Length - one-way	15 ft		
Jumper Cable Size (AWG - 8, 10, or 12)	8		
Total Quantity of RRU Trunk Feeds	3		
Radio	AirScale ACQK B77		
RRU Trunk Feed Peak DC Input Power (W)	931		

Meiric Fill in the yellow highlighted cells as appropriate.

See definitions for each cell on the Notes tab.

Yes Up-converters or Allocation

Cells that become highlighted in red indicate that the voltage at the RRU falls below the Minimum RRU Operating Voltage and the RRU will not operate. A cell that reads "INVALID" indicates that the loss in the cable would exceed the power rating of the RRU and the calculation cannot be performed.

RRU Trunk Feed Busy Hour Input Power (W)	605
Minimum Source Voltage (V)	52
Converter Output Voltage (V)	58
Minimum RRU Operating Voltage (VDC)	40
Peak Power Rating of Power Extend Conv (W)	1000
Total Cable loop length	1150 ft
Cable Resistance (Ohms)	0.5129

RRU Voltage (VDC) at Min Source Voltage and Peak Power
RRU Trunk Feed Current (A) at Min Source Voltage and Peak Power
Source Power (W) per RRU Trunk Feed at Min Source V and Peak RRU Power
Total Source Power (W) at Min Source Voltage and Peak RRU Power
Peak Power System Current (A) Required for RRUs
Qty of Power Extend Converters Req'd per RRU Trunk Feed
Qty of Power Extend Converters Req'd per Site
of Total Bullet Positions Required

without Converter	with Converter
----------------------	-------------------

without Converter	with Converter
----------------------	-------------------

RRU Voltage (VDC) at Min Source Voltage and Busy Hour	45.12	52.04
RRU Trunk Feed Current (A) at Min Source Voltage and Busy Hour	13.41	11.63
Source Power (W) at Min Source V and Busy Hour per RRU Trunk Feed	697.4	674.5
Total Source Power (W) at Min Source Voltage and Busy Hour	2092.2	2023.6

Power Extend Converter Average Power Level Above which a Space is required Between Each 4 Units (W)	250
Power Extend Converter Average Power Level Above which a Space is required Between Each 3 Units (W)	475
Power Extend Converter Average Power Level Above which a Space is required Between Each 2 Units (W)	525
Power Extend Converter Average Power Level Above which a Space is required Between Each Unit (W)	650

RRU Trunk Feed Busy Hour Input Power (W)	605
Minimum Source Voltage (V)	52
Converter Output Voltage (V)	58
Minimum RRU Operating Voltage (VDC)	40
Peak Power Rating of Power Extend Conv (W)	1000
Total Cable loop length	1150 ft
Cable Resistance (Ohms)	0.5129

RRU Voltage (VDC) at Min Source Voltage and Peak Power
RRU Trunk Feed Current (A) at Min Source Voltage and Peak Power
Source Power (W) per RRU Trunk Feed at Min Source V and Peak RRU Power
Total Source Power (W) at Min Source Voltage and Peak RRU Power
Peak Power System Current (A) Required for RRUs
Qty of Power Extend Converters Req'd per RRU Trunk Feed
Qty of Power Extend Converters Req'd per Site
of Total Bullet Positions Required

RRU Voltage (VDC) at Min Source Voltage and Busy Hour	45.12	52.04
RRU Trunk Feed Current (A) at Min Source Voltage and Busy Hour	13.41	11.63
Source Power (W) at Min Source V and Busy Hour per RRU Trunk Feed	697.4	674.5
Total Source Power (W) at Min Source Voltage and Busy Hour	2092.2	2023.6

Power Extend Converter Average Power Level Above which a Space is required Between Each 4 Units (W)	250
Power Extend Converter Average Power Level Above which a Space is required Between Each 3 Units (W)	475
Power Extend Converter Average Power Level Above which a Space is required Between Each 2 Units (W)	525
Power Extend Converter Average Power Level Above which a Space is required Between Each Unit (W)	650

NOTE: No Converter(s) are needed because the voltage drop without converters is OK. See detailed information to the right.

NOTE: No Converter(s) are needed because the voltage drop without converters is OK. See detailed information to the right.



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Professional Engineer

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DC TRUNK CABLE CALCULATOR

E-2

ANTENNA POSITION	ANTENNA MODEL	ANTENNA MAKE	AZIMUTH	RAD CENTER FT. AGL.	TMAS, RRHS & DIPLEXERS	COAXIAL FEEDER	
					MODEL	SIZE	LENGTH
#1	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	25°	AEQU: 116'-9" AEQK: 113'-2"	-	SHARED FIBER	60'
#2	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	25°	115'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	60'
#3	-	-	-	-	-	-	-
#4	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	25°	115'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	60'
#5	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	140°	AEQU: 130'-9" AEQK: 127'-2"	-	SHARED FIBER	130'
#6	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	140°	129'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	130'
#7	-	-	-	-	-	-	-
#8	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	140°	129'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	130'
#9	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	250°	AEQU: 108'-9" AEQK: 105'-2"	-	SHARED FIBER	130'
#10	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	250°	107'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	130'
#11	-	-	-	-	-	-	-
#12	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	250°	107'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	130'

1. VERIFY ANTENNA DIMENSIONS WITH MANUFACTURER.
2. ALL NEW ANTENNAS SHALL RECEIVE ANTENNA MOUNTING KIT FOR 2 TO 4.5 O.D. MAST (QTY. 2)
3. ALL NEW ANTENNAS SHALL RECEIVE A LOCKING TILT MOUNT KIT 0-13 DEGREES DOWNTILT ANGLE
4. VERIFY FINAL ANTENNA MODEL WITH CURRENT VERSION OF THE AT&T RFDS.

The diagram illustrates the Alpha & Beta Sector antenna layout. It features four antenna positions: 1 (AEQU), 2 (orange), 3 (AEQK), and 4 (orange). Antennas 2 and 4 are separated by a minimum of 6 feet. Each antenna is connected to a main surge arrester and a RET surge arrester. The connections for Antenna 2 and 4 are detailed, showing dual band 700B/C and 700D antennas, as well as PCS and WCS RRR connections. The diagram also shows the connection of dummy loads and RET splitters to the antenna ports. A legend at the bottom identifies the symbols used: Dummy Load, RET Splitter, Main Surge Arrester, and RET Surge Arrester. The diagram is labeled 'ALPHA & BETA SECTOR' at the bottom.

Diagram illustrating the minimum 6-foot separation between 700B/C and 700D antennas. The diagram shows three antenna positions (1, 2, and 4) connected to various radio equipment. Antenna Position 1 is connected to a 12' cable and a 12' cable. Antenna Position 2 is connected to a 12' cable and a 12' cable. Antenna Position 4 is connected to a 12' cable and a 12' cable. The diagram also shows the connection of the antennas to the radio equipment, including the 700B/C and 700D antennas, and the 700B/C and 700D antennas. The diagram includes a legend for the symbols used: Dummy Load, RET Splitter, Main Surge Arrestor, and RET Surge Arrestor.

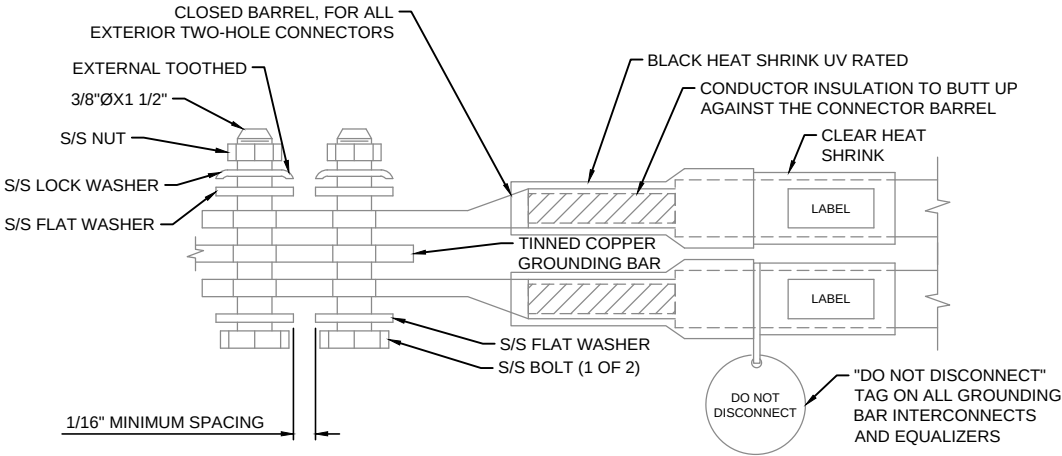
NOTES:

1. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER WITH ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
2. PLUMBING DIAGRAM SHOWN IS BASED ON APPROVED FINAL RFDS ID: 4445171 DATED ON 02/25/22.



NOTES:

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUNDING BAR. ROUTE CONDUCTORS TO BURIED GROUNDING RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL GROUNDING BARS SHALL BE STAMPED IN TO THE METAL "IF STOLEN DO NOT RECYCLE." THE CONTRACTOR SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION AND LABEL EACH SECTION ("P", "A", "N", "I") WITH 1" HIGH LETTERS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. FOR GROUND BOND TO STEEL ONLY: INSERT A CADMIUM FLAT WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
5. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUNDING CONDUCTOR DOWN TO GROUNDING BUS.
6. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUNDING BAR AND BOLTED ON THE BACK SIDE. INSTALL BLACK HEAT-SHRINKING TUBE, 600 VOLT INSULATION, ON ALL GROUNDING TERMINATIONS. THE INTENT IS TO WEATHERPROOF THE COMPRESSION CONNECTION.
7. SUPPLIED AND INSTALLED BY CONTRACTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUNDING BAR AS REQUIRED, PROVIDING 50% SPARE CONNECTION POINTS.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).



1 EXTERIOR TWO HOLE LUG DETAIL

SCALE: N.T.S.

GENERAL NOTES:

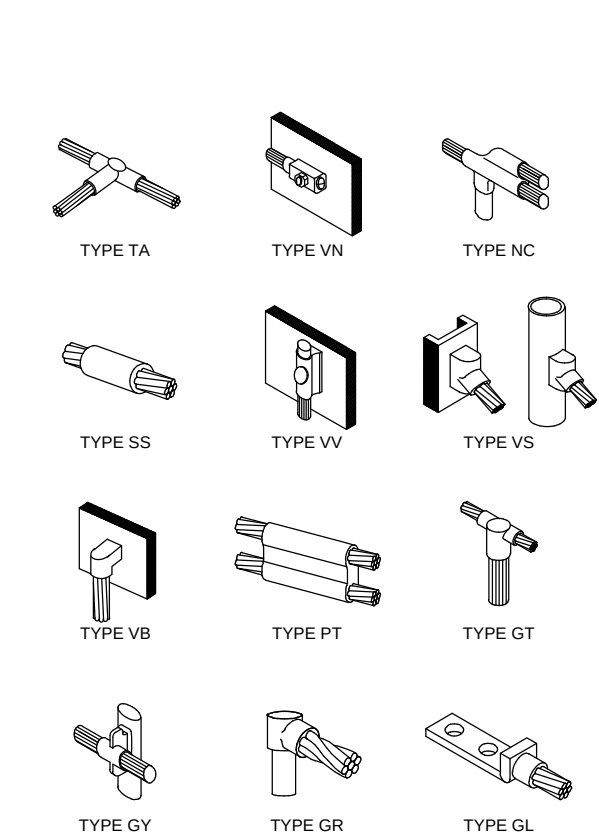
1. CONTRACTOR SHALL HAVE A COMPLETE UNDERSTANDING OF THE CONTENTS OF AT&T STANDARD TP-76416.
2. ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
3. ALL GROUND CONNECTIONS FOR ALL RELOCATED EQUIPMENT SHALL BE RE-ESTABLISHED BY THE CONTRACTOR. CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.

GROUNDING NOTES:

1. TOWER GROUNDING BAR: EXTEND (2) #2 AWG TINNED CU WIRE FROM BURIED GROUND RING UP TO THE TOWER GROUND BAR AND MAKE A MECHANICAL CONNECTION. SECURE GROUND BAR DIRECTLY TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
2. ANTENNA GROUNDING BAR: ANDREW CORPORATION PART #UGBKIT-0424-T MOUNT GROUND BAR DIRECTLY TO TOWER. SECURE TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
3. GROUNDING BAR: LOCATED CLOSE TO GRADE LOCK BOX TESSCO PART #351546: INSTALL PER MANUFACTURER GUIDELINES.
4. EXOTHERMIC OR COMPRESSION CONNECTION FOR PIPE MOUNT TO ANTENNA ROUTE CONDUCTOR TO NEAREST GROUNDING BAR SO THE GROUNDING CONDUCTORS PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. USE #2 AWG SOLID TINNED COPPER CONDUCTOR. GROUNDING CONNECTION SHALL BE LOCATED AT THE TOP 2" OF PIPE.
5. ALL GROUNDING CONDUCTORS SHALL BE #2 AWG COPPER TINNED UNLESS NOTED OTHERWISE.
6. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
7. KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL COMPRESSION GROUNDING CONNECTIONS.
8. ALL EXOTHERMIC CONNECTIONS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
9. ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH AN EXTERNAL TOOTHED LOCK WASHER. GROUNDING BUS BARS MAY HAVE PRE-PUNCHED HOLES OR TAPPED HOLES. ALL HARDWARE SHALL BE SECURITY TORQUE HARDWARE 3/8" STAINLESS STEEL.
10. EXTERNAL GROUNDING CONDUCTOR SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS, CONDUITS, OR SUPPORTS TO PRECLUDE ESTABLISHING A MAGNETIC CHOKE POINT.
11. PLASTIC CLIPS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
12. IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS (SURGE ARRESTORS INSTALLED BY LUCENT ONLY HAVE 6' GROUND TAILS).
13. CONTRACTOR SHALL REPAIR/PLACE EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.
14. DO NOT ALLOW THE COPPER CONDUCTOR TO TOUCH THE GALVANIZED GUY WIRE AT THE CONNECTION POINT OR AT ANY OTHER POINT. NO EXOTHERMICALLY WELDED CONNECTION SHALL BE MADE TO THE GUY WIRE.
15. CONTRACTOR SHALL VERIFY EXISTING SECTOR GROUNDING CONDITION AND GROUND THE PROPOSED EQUIPMENT IN THE SAME MANNER. A PROPOSED SECTOR GROUND BAR SHALL BE INSTALLED IF REQUIRED.

2 GROUNDING BAR DETAIL

SCALE: N.T.S.

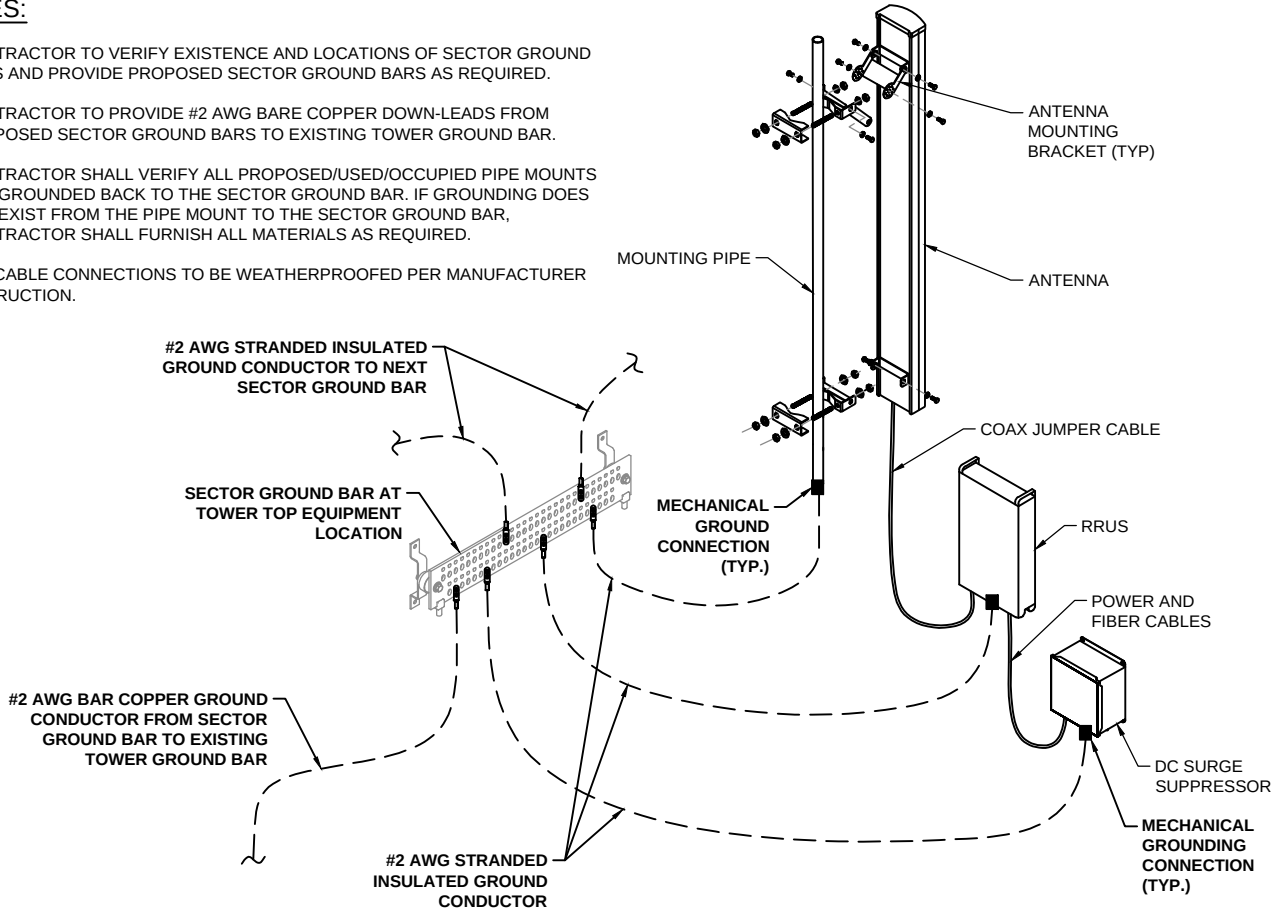


3 GROUNDING DETAILS

SCALE: N.T.S.

NOTES:

1. CONTRACTOR TO VERIFY EXISTENCE AND LOCATIONS OF SECTOR GROUND BARS AND PROVIDE PROPOSED SECTOR GROUND BARS AS REQUIRED.
2. CONTRACTOR TO PROVIDE #2 AWG BARE COPPER DOWN-LEADS FROM PROPOSED SECTOR GROUND BARS TO EXISTING TOWER GROUND BAR.
3. CONTRACTOR SHALL VERIFY ALL PROPOSED/USED/OCCUPIED PIPE MOUNTS ARE GROUNDED BACK TO THE SECTOR GROUND BAR. IF GROUNDING DOES NOT EXIST FROM THE PIPE MOUNT TO THE SECTOR GROUND BAR, CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.
4. ALL CABLE CONNECTIONS TO BE WEATHERPROOFED PER MANUFACTURER INSTRUCTION.



4 TYPICAL ANTENNA GROUNDING SCHEMATIC

SCALE: N.T.S.

5 DETAIL NOT USED

SCALE: N.T.S.



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I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND. LICENSE NUMBER: 35911 EXPIRATION DATE: 06/30/24



IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT

APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS

3	09/27/22	JX COMMENTS
2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
B	06/01/22	REVISION
A	04/27/22	ISSUED FOR REVIEW

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FA# 10072888
USID# 3939
TULIP AVE
7051 CARROL STREET
TAKOMA PARK, MD 20912

GROUNDING DETAILS

G-1

AT&T COAX AND JUMPER COLOR CODE CHART FOR WV-VA SITES

Color Code for Hard-Line Coax to Antennas					Color Code for Jumpers from Antenna to TMAs/Diplexers or RRR -or- from Antenna to Hard-Line Coax														
Sector	Coax Lin	A1	A2	A3	A4	Sector	Technology	Frequency	TX/RX	1st Band	2nd Band	3rd Band	4th Band	5th Band	6th Band	7th Band	8th Band	9th Band	Notes
Alpha	1st Lin	1 Green	2 Green	3 Green	4 Green	A1-1	LTE	700 D/E	TXM/RXM	Green	Gray	Orange							
Alpha	2nd Lin	1 Green	2 Green	3 Green	4 Green	A1-2	LTE	700 D/E	TXD1/RXD1	Green	Gray	Orange	Brown						
		1 Brown	1 Brown	1 Brown	1 Brown	A1-3	LTE	WCS	TXM/RXM	Green	Gray	Red							
						A1-4	LTE	WCS	TXD1/RXD1	Green	Gray	Red	Brown						
						A1-5	LTE	WCS	TXD2/RXD2	Green	Gray	Red	Brown	Brown					
						A1-6	LTE	WCS	TXD3/RXD3	Green	Gray	Red	Brown	Brown	Brown				
						A2-1	UMTS/GSM	850	TXM/RXM	Green	Green	Yellow	Orange						
						A2-2	UMTS/GSM	850	TXD1/RXD1	Green	Green	Yellow	Orange	Brown					
						A2-3	UMTS/GSM	1900	TXM/RXM	Green	Green	Yellow	Violet						
						A2-4	UMTS/GSM	1900	TXD1/RXD1	Green	Green	Yellow	Violet	Brown					
						A2-5	UMTS/LTE	1900	TXD2/RXD2	Green	Green	Yellow	Violet	Brown	Brown				
						A2-6	UMTS/LTE	1900	TXD3/RXD3	Green	Green	Yellow	Violet	Brown	Brown	Brown			
						A3-1	UMTS	850	TXM/RXM	Green	Green	Green	Yellow	Orange					
						A3-2	UMTS	850	TXD1/RXD1	Green	Green	Green	Yellow	Orange	Brown				
						A3-3	UMTS/LTE	1900	TXM/RXM	Green	Green	Green	Yellow	Violet					
						A3-4	UMTS/LTE	1900	TXD1/RXD1	Green	Green	Green	Yellow	Violet	Brown				
						A3-5	UMTS/LTE	1900	TXD2/RXD2	Green	Green	Green	Yellow	Violet	Brown	Brown			
						A3-6	UMTS/LTE	1900	TXD3/RXD3	Green	Green	Green	Yellow	Violet	Brown	Brown	Brown		
						A4-1	LTE	700	TXM/RXM	Green	Green	Green	Green	Gray	Orange				
						A4-2	LTE	700	TXD1/RXD1	Green	Green	Green	Green	Gray	Orange	Brown			
						A4-3	LTE	2100	TXM/RXM	Green	Green	Green	Green	Gray	Violet				
						A4-4	LTE	2100	TXD1/RXD1	Green	Green	Green	Green	Gray	Violet	Brown			
						A4-5	LTE	2100	TXD2/RXD2	Green	Green	Green	Green	Gray	Violet	Brown	Brown		
						A4-6	LTE	2100	TXD3/RXD3	Green	Green	Green	Green	Gray	Violet	Brown	Brown	Brown	
Beta	1st Lin	1 Blue	2 Blue	3 Blue	4 Blue	B1-1	LTE	700 D/E	TXM/RXM	Blue	Gray	Orange							
Beta	2nd Lin	1 Blue	2 Blue	3 Blue	4 Blue	B1-2	LTE	700 D/E	TXD1/RXD1	Blue	Gray	Orange	Brown						
		1 Brown	1 Brown	1 Brown	1 Brown	B1-3	LTE	WCS	TXM/RXM	Blue	Gray	Red							
						B1-4	LTE	WCS	TXD1/RXD1	Blue	Gray	Red	Brown						
						B1-5	LTE	WCS	TXD2/RXD2	Blue	Gray	Red	Brown	Brown					
						B1-6	LTE	WCS	TXD3/RXD3	Blue	Gray	Red	Brown	Brown	Brown				
						B2-1	UMTS/GSM	850	TXM/RXM	Blue	Blue	Yellow	Orange						
						B2-2	UMTS/GSM	850	TXD1/RXD1	Blue	Blue	Yellow	Orange	Brown					
						B2-3	UMTS/GSM	1900	TXM/RXM	Blue	Blue	Yellow	Violet						
						B2-4	UMTS/GSM	1900	TXD1/RXD1	Blue	Blue	Yellow	Violet	Brown					
						B2-5	UMTS/LTE	1900	TXD2/RXD2	Blue	Blue	Yellow	Violet	Brown	Brown				
						B2-6	UMTS/LTE	1900	TXD3/RXD3	Blue	Blue	Yellow	Violet	Brown	Brown	Brown			
						B3-1	UMTS	850	TXM/RXM	Blue	Blue	Blue	Yellow	Orange					
						B3-2	UMTS	850	TXD1/RXD1	Blue	Blue	Blue	Yellow	Orange	Brown				
						B3-3	UMTS/LTE	1900	TXM/RXM	Blue	Blue	Blue	Yellow	Violet					
						B3-4	UMTS/LTE	1900	TXD1/RXD1	Blue	Blue	Blue	Yellow	Violet	Brown				
						B3-5	UMTS/LTE	1900	TXD2/RXD2	Blue	Blue	Blue	Yellow	Violet	Brown	Brown			
						B3-6	UMTS/LTE	1900	TXD3/RXD3	Blue	Blue	Blue	Yellow	Violet	Brown	Brown	Brown		
						B4-1	LTE	700	TXM/RXM	Blue	Blue	Blue	Blue	Gray	Orange				
						B4-2	LTE	700	TXD1/RXD1	Blue	Blue	Blue	Blue	Gray	Orange	Brown			
						B4-3	LTE	2100	TXM/RXM	Blue	Blue	Blue	Blue	Gray	Violet				
						B4-4	LTE	2100	TXD1/RXD1	Blue	Blue	Blue	Blue	Gray	Violet	Brown			
						B4-5	LTE	2100	TXD2/RXD2	Blue	Blue	Blue	Blue	Gray	Violet	Brown	Brown		
						B4-6	LTE	2100	TXD3/RXD3	Blue	Blue	Blue	Blue	Gray	Violet	Brown	Brown	Brown	
Gamma	1st Lin	1 White	2 White	3 White	4 White	G1-1	LTE	700 D/E	TXM/RXM	White	Gray	Orange							
Gamma	2nd Lin	1 White	2 White	3 White	4 White	G1-2	LTE	700 D/E	TXD1/RXD1	White	Gray	Orange	Brown						
		1 Brown	1 Brown	1 Brown	1 Brown	G1-3	LTE	WCS	TXM/RXM	White	Gray	Red							
						G1-4	LTE	WCS	TXD1/RXD1	White	Gray	Red	Brown						
						G1-5	LTE	WCS	TXD2/RXD2	White	Gray	Red	Brown	Brown					
						G1-6	LTE	WCS	TXD3/RXD3	White	Gray	Red	Brown	Brown	Brown				
						G2-1	UMTS/GSM	850	TXM/RXM	White	White	Yellow	Orange						
						G2-2	UMTS/GSM	850	TXD1/RXD1	White	White	Yellow	Orange	Brown					
						G2-3	UMTS/GSM	1900	TXM/RXM	White	White	Yellow	Violet						
						G2-4	UMTS/GSM	1900	TXD1/RXD1	White	White	Yellow	Violet	Brown					
						G2-5	UMTS/LTE	1900	TXD2/RXD2	White	White	Yellow	Violet	Brown	Brown				
						G2-6	UMTS/LTE	1900	TXD3/RXD3	White	White	Yellow	Violet	Brown	Brown	Brown			
						G3-1	UMTS	850	TXM/RXM	White	White	White	Yellow	Orange					
						G3-2	UMTS	850	TXD1/RXD1	White	White	White	Yellow	Orange	Brown				
						G3-3	UMTS/LTE	1900	TXM/RXM	White	White	White	Yellow	Violet					
						G3-4	UMTS/LTE	1900	TXD1/RXD1	White	White	White	Yellow	Violet	Brown				
						G3-5	UMTS/LTE	1900	TXD2/RXD2	White	White	White	Yellow	Violet	Brown	Brown			
						G3-6	UMTS/LTE	1900	TXD3/RXD3	White	White	White	Yellow	Violet	Brown	Brown	Brown		
						G4-1	LTE	700	TXM/RXM	White	White	White	White	Gray	Orange				
						G4-2	LTE	700	TXD1/RXD1	White	White	White	White	Gray	Orange	Brown			
						G4-3	LTE	2100	TXM/RXM	White	White	White	White	Gray	Violet				
						G4-4	LTE	2100	TXD1/RXD1	White	White	White	White	Gray	Violet	Brown			
						G4-5	LTE	2100	TXD2/RXD2	White	White	White	White	Gray	Violet	Brown	Brown		
						G4-6	LTE	2100	TXD3/RXD3	White	White	White	White	Gray	Violet	Brown	Brown	Brown	

Base Color	
Sector A	Green
Sector B	Blue
Sector C	White

Technology Color	
LTE	Gray
UMTS	Yellow
GSM	Black

Frequency Color	
700/850	Orange
WCS	Red
1900/2100	Violet

Type Color	
Main (M)	White
Diversity (D)	Brown

Jumpers from TMA to Antenna/Diplexer to Equipment: ORANGE band to note Low-Side frequencies VIOLET band to note High-Side frequencies YELLOW band to note UMTS GRAY band to note LTE

FIBER TRUNK IN COLOR CODE:	
1ST=	1 GRAY
2ND=	2 GRAY
DC POWER TRUNK COLOR CODE:	
1ST=	1 WHITE / 1 BLUE
2ND=	2 WHITE / 1 BLUE
3RD=	3 WHITE / 1 BLUE
4TH=	4 WHITE / 1 BLUE



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CONSTRUCTION _____
A & E _____

PROJECT NO: EP4TURWL

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CHECKED BY: LW

SUBMITTALS

No.	Date	Description
3	09/27/22	JX COMMENTS
2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
B	06/01/22	REVISION
A	04/27/22	ISSUED FOR REVIEW

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FA# 10072888
USID# 3939
TULIP AVE
7051 CARROL STREET
TAKOMA PARK, MD 20912

COLOR CODE CHART

S-1

Field	Length	Description
USID	6	Six characters that defined the sites USID. USID's less than 6 characters in length are preceded with 0's (zeros) (example:003631)
Cellid1	1	Allowed Value Description
		A Alpha
		B Beta
		C Gamma
Cellid2	1	D Delta
		E Epsilon
		F Zeta
Cellid3	1	- No Transmitter connected to this port
AntPos	1	Allowed Value Description
		1 Antenna Position 1 on this face
		2 Antenna Position 2 on this face
		i Antenna Position x on this face
		i Antenna Position x on this face
		9 Antenna Position 9 on this face
		- Antenna Position unknown
FreqBand	1	Allowed Value Description
		2 2100 MHz (AWS1) only
		3 2300 MHz (WCS) only
		6 Band 66 (AWS3) only
		7 700 MHz B & C Band only
		8 850 MHz only
		9 1900 MHz (PCS)
		A 2100 MHz (AWS1) & Band 66 (AWS3) combined
		B 1900 MHz (PCS) & Band 66 (AWS3) combined
		C 2100 MHz (AWS1) & Band 66 (AWS3) & 2300 MHz (WCS) combined
		D 1900 MHz (PCS) & 2100 MHz (AWS1) combined
		E 2300 MHz (WCS) & Band 66 (AWS3) combined
		F 1900 MHz (PCS) & 2300 MHz (WCS) combined
		G 1900 MHz (PCS) & 2100 MHz (AWS1) & Band 66 (AWS3) combined
		H 2100 MHz (AWS1) & 2300 MHz (WCS) combined
		I 1900 MHz (PCS) & 2300 MHz (WCS) & Band 66 (AWS3) combined
		J 1900 MHz (PCS) & 2100 MHz (AWS1) & 2300 MHz (WCS) combined
		K 700 MHz B & C Band & 850 MHz combined
		M 1900 MHz (PCS) & 2100 MHz (AWS1) & Band 66 (AWS3) & 2300 MHz (WCS) combined
		P upper 700 MHz - Band 14 (FirstNet)
		Q 700 MHz D & E Band only
		R 700 MHz B & C & Band 14 (FirstNet) & 850 MHz combined
		S 700 MHz B & C & 700 MHz D & E & 850 MHz combined
		T Tri-Band: Band 12 (700 MHz B&C), Band 14 (FirstNet), and Band 29 (700 MHz D&E)
		U 700 MHz B & C & 700 MHz D & E & Band 14 (FirstNet) & 850 MHz combined
		W 700 MHz D & E & Band 14 (FirstNet) combined
		X 700 MHz B & C & Band 14 (FirstNet) combined
		Y 700 MHz D & E & 850 MHz combined
		Z Band 14 (FirstNet) & 850 MHz combined
		- No Frequency Assigned "not-in-use"

Field	Length	Description
Tech	1	Allowed Value Technology / Technology Combination
		F License protection/FCC compliance/rWLL
		G Reserved
		J LTE-5G NR
		K UMTS-LTE-5G NR
		L LTE
		N None/Reserved
		U UMTS
		V UMTS-LTE
		Y UMTS-5G NR
		H Reserved
		M Exception
		P Reserved
		Q Reserved
		R 5G NR
		S Reserved
		T Reserved

Delimiter	13th character
-	Delimiter
B	Border Control
C	CGSA
W	WCS in combination with other bands
P	License Protection
O	Optimized
Delimiter	14th character
-	Delimiter
Z	Programming Code for RET validated

2.3.1 Dual Broadband Antennas - TYPE 1

Powerwave, Kathrein and older Andrew antennas will be recognized by a RET controller as TYPE1 Antenna Line Devices. These require 2 AISG connections. One connection will be from the AISG source (RRH, TMA, RET Controller or Homerun Cable) to the first RET motor and the second connection will be from RET motor 1 to RET motor 2.

Connections from the RET controller will be made to the male connector of the RET motor. Appropriate daisy chain connection will then have to be made to the next RET motor. Figure 5 below is a Powerwave antenna, but the Kathrein will be very similar in appearance and connection.

For all Type 1 dual broadband antennas, the daisy chain connection should be made and both RET motors should be configured in the OSS, even if the high band RET motor is not to be utilized until future AWS launches.

Dual Broadband Antennas - TYPE 17

Newer Andrew antennas and all KMW antennas will be recognized by RET controllers as TYPE17 Antenna Line Devices since there are multiple ALDs on one bus. These antennas only require one AISG connection since both RET motors are inside the antenna. Connections from the RET controller will be made to the male connector of the RET/AISG Antenna Port. Figure 7 below is an Andrew antenna, but the KMW antenna will be very similar in appearance and connection.

Below is the list of approved RET Type 17 antennas as per 6/29/2011. Andrew will continue to phase out older models which are Type 1 with newer models that will be Type 17.

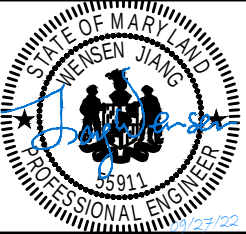
Vendor	Frequency Band	HBW	Length	Model
Andrew	Dual Broadband	65°	6"	SBNH-1D6565B
Andrew	Dual Broadband	65°	8"	SBNH-1D6585C
Andrew	Dual Broadband	85°	6"	SBNH-1D8585B
Andrew	Dual Broadband	85°	8"	SBNH-1D8585C
KMW	Dual Broadband	65°	4"	AM-X-CD-14-65-00T-RET
KMW	Dual Broadband	65°	6"	AM-X-CD-16-65-00T-RET
KMW	Dual Broadband	65°	8"	AM-X-CD-17-65-00T-RET
KMW	Dual Broadband	85°	4"	NOT AVAILABLE YET
KMW	Dual Broadband	85°	6"	NOT AVAILABLE YET
KMW	Dual Broadband	85°	8"	AM-X-CD-16-85-00T-RET
KMW	Single Broadband	65°	4"	AM-X-CW-14-65-00T-RET
KMW	Single Broadband	65°	6"	AM-X-CW-16-65-00T-RET
KMW	Single Broadband	65°	8"	AM-X-CW-18-65-00T-RET
KMW	Single Broadband	85°	4"	AM-X-CW-13-85-00T-RET
KMW	Single Broadband	85°	6"	AM-X-CW-15-85-00T-RET
KMW	Single Broadband	85°	8"	AM-X-CW-16-85-00T-RET



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443.230.4400x113

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I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED
OR APPROVED BY ME, AND THAT I AM A Duly LICENSED
PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF
MARYLAND, LICENSE NUMBER: 35911, EXPIRATION DATE 06/30/22



IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS THEY
ARE ACTING UNDER THE DIRECTION OF A LICENSED
PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT

APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS			
3	09/27/22	JX COMMENTS	
2	08/23/22	ISSUED	
1	06/13/22	REVISION	
0	06/01/22	ISSUED	
B	06/01/22	REVISION	
A	04/27/22	ISSUED FOR REVIEW	

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FA# 10072888
USID# 3939
TULIP AVE

7051 CARROL STREET
TAKOMA PARK, MD 20912

LTE RET NAMING
CONVENTION

App No:

2022091949

Application General Information

Applicant Name	Jacobs Telecommunications	Received	9/14/2022
Application Type	Minor Modification	Ann. Plan?	Yes
Carrier	AT&T Wireless	Will site be used to support government telecommunications facilities or other equipment for government use?	Yes
Solution Type	Macro		
Existing	Existing		
		Gvt. Use Desc.	Deploying CBAND freq

Application Description

Remove (3) Antennas and all existing TMAs and Diplexers. Install (6) Antennas stacked in same position. Swap equipment cabinets.

Site Information

Site Id	27	Zoning	NR-0.75
Structure Type	Building	Latitude	38.9747
Street Address	7051 Carroll Ave	Longitude	-77.01045
County Site Name	Takoma Tower	Ground Elevation	282
Carrier Site Name	Tulip Ave	City	Takoma Park
Site Owner	Takoma Tower LP	Lease Status	Leased
Structure Owner	Takoma Tower LP	Does the structure require an antenna structure registration under FCC Title 47	No
Existing Structure Height	120	Distance to Residential Property (New, Colocation Only)	
Provide the proposed height of the replacement structure without any antenna (New Apps Only)		Distance to Commercial Property (New, Colocation Only)	

Justification of why this site was selected:

Existing site, equipment upgrade required

Nearby Sites (New Apps Only):

Wednesday, September 14, 2022

3:25:08 PM

App No:

2022091949

Screening considerations(New, Colocation Apps Only):

App No:

2022091949

6409 Questions

Does this qualify as a 6409 application? (Minor Mod, Colocations Only)

Yes

For towers outside the public ROW will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 20 feet, whichever is greater?

No

Will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 6 feet?

No

For towers outside the public ROW will the proposed installation increase the width by adding appurtenance to the body of the structure that would protrude from the edge of the structure by more than 20 feet?

No

Will the proposed installation require more the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets?YN

No

Will the proposed installation increase the height of the structure by: (1) more than 10% or (2) more than 10 feet, whichever is greater?

No

Does the structure or current installation have concealment elements/measures?

No

Will the proposed installation require excavation or expansion outside the current boundaries of the site?

No

If yes, describe how the proposed installation does not defeat the existing concealment.

Small Wireless Facility Information

Small Wireless Facility Questions

Small Wireless Facility?

No

Is the structure 10% taller than adjacent structures?

Cumulative volume of the proposed wireless equipment(s) exclusive of antennas in cubic feet

Please list adjacent structure heights

Cumulative volume of the proposed antenna(s) exclusive of equipment in cubic feet

Tribal Lands?

No

ROW Information

PROW?

No

Pole Number

ROW owner

ROW width

Wednesday, September 14, 2022

3:25:08 PM

App No: 2022091949

Antenna Information

Antenna Compliance Yes
Compliance Desc
Antenna Location Yes
Antenna Loc. Desc.
Env. Assessment
Cat. Excluded?
Routine Env. Evaluation checked

Antenna Model AEQU
Frequency 3450-3550
RAD Center 107 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1

Antenna Model AEQK
Frequency 3700-3980
RAD Center 107 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1

Antenna Model AEQU
Frequency 3450-3550
RAD Center 129 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1

Antenna Model AEQK
Frequency 3700-3980
RAD Center 129 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1

Antenna Model AEQU
Frequency 3450-3550
RAD Center 115 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1

Antenna Model AEQK
Frequency 3700-3980
RAD Center 115 Max ERP 37172 Antenna Dimensions 29.52" x 17.2" x 9.49" Quantity 1



475589A AEQK C-band Radio Unit Technical Datasheet

HW Unit Technical Datasheet
V1.0

AEQK AirScale MAA 64T64R 192AE n77 200W

Technical datasheet

Product Specifications	
Standard	3GPP/FCC NR compliant, TDD
Band / Frequency range	3700~3980MHz
Supported RAT	5G
Max. supported modulation	256QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	200MHz
Occupied bandwidth OBW	100MHz+100MHz for 32TRX + 32TRX split mode
Total average EIRP	77dBm
Max. output power per TRX	3.125 W / TRX (200 W total) - SW settable up to 13 dB down
Dimensions / Volume	750 x 450 x 240 mm (H x W x D)
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	727 W (75% DL duty cycle, ETSI Average)
Optical ports	2xSFP28, 10/25GE eCPRI
Other interfaces / Connector type	LMI / HDMI, RF monitor port / SMA, Control AISG, External Alarms / MDR26, status LEDs
Operational temperature range	-40degC to +55C
Cooling	Natural convection cooling
Installation options / mechanical tilt	Pole, wall, with vertical adjustment of $\pm 15^\circ$ (thermally limited)
Ingress / Surge protection	IP65/Class II 20KA

AirScale High Power MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Digital beamforming for multi-user MIMO
- Connectivity with AirScale BBU (via eCPRI)
- Beamforming capable 64T64R with total 200W output power
- 32TRX + 32TRX split mode support



AEQK 475589A

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AEQU Datasheet

Preliminary Datasheet

AEQU AirScale MAA 64T64R 192AE n77 200W

Technical data (Preliminary)

Product Specifications	
Standard	3GPP/FCC, TDD
Supported RAT by HW	5G
Band / Frequency range	3450 - 3550 MHz
Max. supported modulation	256 QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	100 MHz
Occupied bandwidth OBW	100 MHz
Total average EIRP	77.5dBm
Max. output power per TRX	3.125 W / TRX (200W total)
Dimensions / Volume	750 x 450 x 240 mm (H x W x D) / 71.7 L
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	730 W (75% DL duty cycle, ETSI 24h average load)
Optical ports	2 x SFP28, 10/25GE eCPRI
Other interfaces / Connector type	AISG / RS-485, EAC (6 alarms + 1 control) / MDR26, RF Monitor Port/SMA, 4 status LEDs
Operational temperature range	-40 °C ... +55 °C
Cooling	Natural convection cooling
Installation options	Pole / Wall, ± 15° mechanical vertical tilt
Ingress / Surge protection	IP65 / Class II 20 kA

AirScale High Power Wide Band MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Beamforming capable 64T64R with total 200W output power



AEQU 476085A

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Radio Frequency Safety Survey Report Prediction (RFSSRP)

AT&T Mobility Rooftop Facility

<u>Site ID:</u> TULIP AVE <u>Site Name:</u> TULIP AVE <u>Address:</u> 7051 CARROL STREET, TAKOMA PARK, MD 20912 <u>Latitude:</u> 38.974747 <u>Longitude:</u> -77.010437 <u>USID:</u> 3939 <u>FA:</u> 10072888	<u>Prepared for:</u> Jacobs <u>Centerline PN:</u> 950032-101 <u>Pace ID:</u> MRWSH048703; MRWSH048684 <u>Report Writer:</u> Zyotty Thamsil <u>Date:</u> August 11, 2022 <u>Report Reviewer:</u> Yasir Alqadhili
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Statement of Compliance

AT&T will be compliant with FCC Regulations upon installation of recommended mitigation measures.

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1.0 GENERAL SUMMARY

Centerline Communications, LLC (“Centerline”) has been contracted to provide a Radio Frequency (RF) Analysis for the following AT&T Mobility wireless rooftop facility to determine whether the facility is in compliance with federal standards and regulations regarding RF emissions. This analysis includes theoretical emissions calculations, for all equipment for AT&T Mobility.

1.1 SITE SUMMARY

Analysis Site Data	
Site USID:	3939
Site FA#:	10072888
Site Name:	TULIP AVE
Site Address:	7051 CARROL STREET, TAKOMA PARK MD 20912
Site Latitude:	38.974747
Site Longitude:	-77.010437
Facility Type:	Rooftop
Compliance Summary	
Compliance Status:	Compliant Upon Mitigation Installation
Maximum Modeled AT&T MPE% on Walking Surface (General Public Limit):	111.72%
Maximum Modeled AT&T MPE% at Ground Level (General Public Limit):	0.91%
Site Survey Data	
Is Access Locked or Controlled? :	Unknown
Lock or Control Measures if Present:	Unknown
Parapet Height:	19"
Site Data Information	
CD:	5G NR 1SR CBAND_10072888_AE203_20220601_TULIP AVE. Rev 0ss_RL_6.13.22
RFDS:	WASHIN~3



Signage and barriers are the primary means of mitigating access to accessible areas of exposure. Below is a summary of existing and recommended signage at this AT&T facility.

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken						
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0
Alpha	0	0	0	0	0	0
Beta	0	12	0	0	0	X
Gamma	0	0	0	0	0	0

Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	15	0	0	0	0	X
Gamma	0	0	0	0	2	0	0	0	0	0

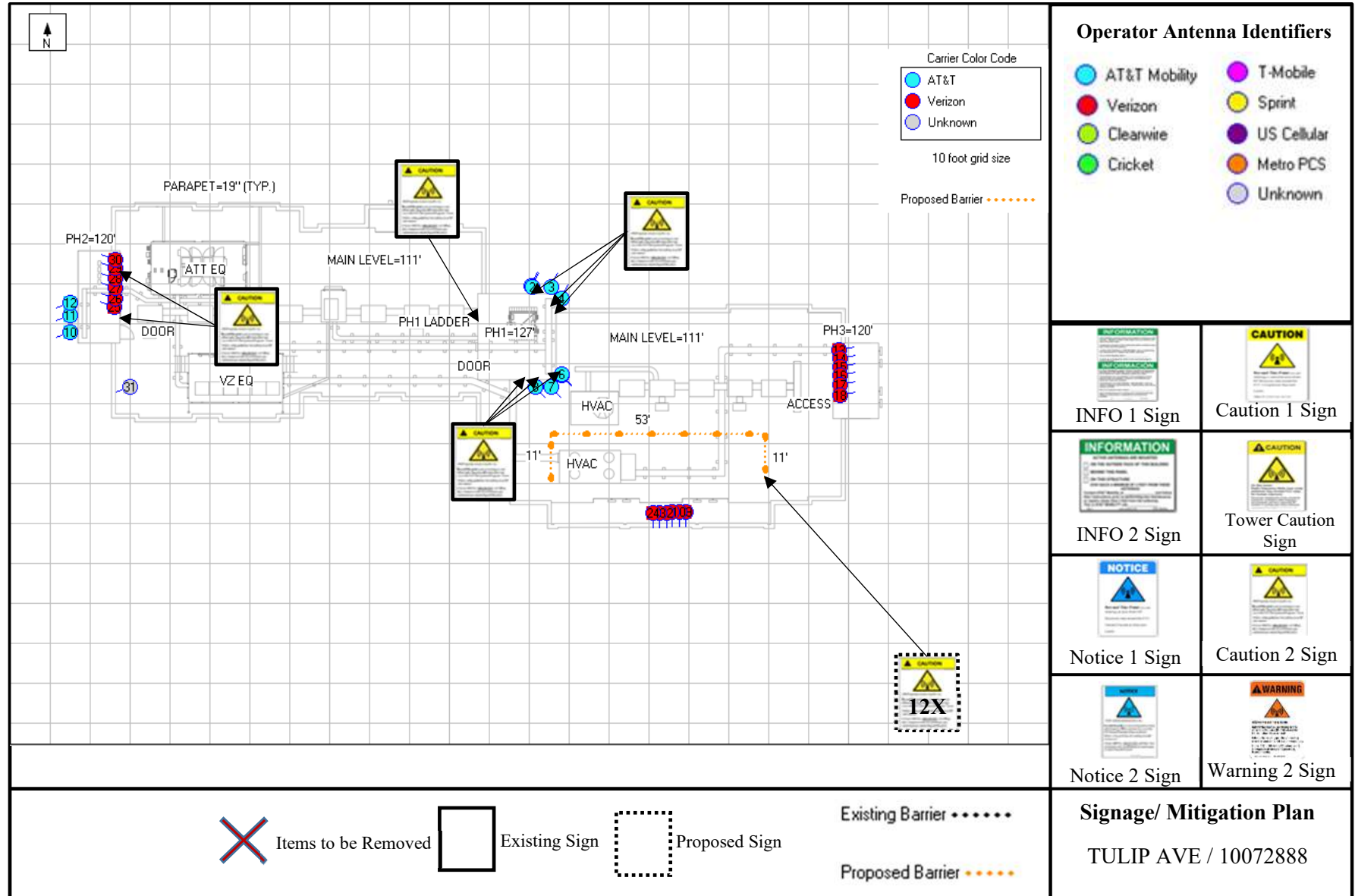
Beta:

- Install a 75' barrier (11'x53'x11' segments) with an estimated (12) stanchions. Install (12) Caution 2 signs on the barrier.

Notes:

- Ensure all barriers are at least 6' away from any unprotected roof edges.
- The existing Caution 2 sign on PH1 ladder is not required and can be removed.
- The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.

2.0 SITE SCALE MAP



2.1 C-BAND ANALYSIS

- All adjacent buildings are >68' away laterally from the AEQK/AEQU antennas and/or >15' below the bottom tips of the AEQK/AEQU antennas.



3.0 ANTENNA INVENTORY

ANT ID	Operator	Antenna Make	Antenna Model	Type	Freq (MHz)	TPO (Watts)	# of TX	Azimuth (°)	BW (°)	Gain (dBd)	Total ERP (Watts)	Length (ft.)	Antenna Z Value (ft.) AGL*
1	AT&T	Nokia	AEQK	Panel	3700	67.78	1	25	13	22.62	12390.86	2.5	129.5
2	AT&T	Nokia	AEQU	Panel	3450	67.78	1	25	13	22.62	12390.86	2.5	126.0
3	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	25	70	10.75	1426.20	4.6	126.7
3	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	25	70	10.75	1426.20	4.6	126.7
3	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	1900	30.00	4	25	58	15.45	4209.02	4.6	126.7
3	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2100	30.00	4	25	60	15.85	4615.10	4.6	126.7
4	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	2	25	70	10.75	713.10	4.6	126.7
4	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	850	30.00	4	25	70	10.95	1493.42	4.6	126.7
4	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2300	18.00	4	25	63	16.05	2899.56	4.6	126.7
5	AT&T	Nokia	AEQK	Panel	3700	67.78	1	140	13	22.62	12390.86	2.5	129.5
6	AT&T	Nokia	AEQU	Panel	3450	67.78	1	140	13	22.62	12390.86	2.5	126.0
7	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	140	70	10.75	1426.20	4.6	126.7
7	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	140	70	10.75	1426.20	4.6	126.7
7	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	1900	30.00	4	140	58	15.45	4209.02	4.6	126.7
7	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2100	30.00	4	140	60	15.85	4615.10	4.6	126.7
8	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	2	140	70	10.75	713.10	4.6	126.7
8	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	850	30.00	4	140	70	10.95	1493.42	4.6	126.7
8	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2300	18.00	4	140	63	16.05	2899.56	4.6	126.7
9	AT&T	Nokia	AEQK	Panel	3700	67.78	1	250	13	22.62	12390.86	2.5	115.5
10	AT&T	Nokia	AEQU	Panel	3450	67.78	1	250	13	22.62	12390.86	2.5	112.0
11	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	250	70	10.75	1426.20	4.6	112.7
11	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	4	250	70	10.75	1426.20	4.6	112.7
11	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	1900	30.00	4	250	58	15.45	4209.02	4.6	112.7
11	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2100	30.00	4	250	60	15.85	4615.10	4.6	112.7
12	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	700	30.00	2	250	70	10.75	713.10	4.6	112.7

ANT ID	Operator	Antenna Make	Antenna Model	Type	Freq (MHz)	TPO (Watts)	# of TX	Azimuth (°)	BW (°)	Gain (dBd)	Total ERP (Watts)	Length (ft.)	Antenna Z Value (ft.) AGL*
12	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	850	30.00	4	250	70	10.95	1493.42	4.6	112.7
12	AT&T	COMMSCOPE	NNHH-65A-R4	Panel	2300	18.00	4	250	63	16.05	2899.56	4.6	112.7
13	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	80	68	12.33	2736.02	6.0	126.0
14	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	80	66	12.62	2924.96	6.0	126.0
15	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	80	68	12.33	2736.02	6.0	126.0
16	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	80	66	12.62	2924.96	6.0	126.0
17	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	80	66	15.84	6139.32	6.0	126.0
18	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	80	63	16.39	6968.19	6.0	126.0
19	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	180	68	12.33	2736.02	6.0	117.0
20	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	180	66	12.62	2924.96	6.0	117.0
21	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	180	68	12.33	2736.02	6.0	117.0
22	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	180	66	12.62	2924.96	6.0	117.0
23	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	180	66	15.84	6139.32	6.0	117.0
24	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	180	63	16.39	6968.19	6.0	117.0
25	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	290	68	12.33	2736.02	6.0	126.0
26	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	290	66	12.62	2924.96	6.0	126.0
27	Verizon	GENERIC	PANEL 6FT	Panel	700	40.00	4	290	68	12.33	2736.02	6.0	126.0
28	Verizon	GENERIC	PANEL 6FT	Panel	850	40.00	4	290	66	12.62	2924.96	6.0	126.0
29	Verizon	GENERIC	PANEL 6FT	Panel	1900	40.00	4	290	66	15.84	6139.32	6.0	126.0
30	Verizon	GENERIC	PANEL 6FT	Panel	2100	40.00	4	290	63	16.39	6968.19	6.0	126.0
31	Unknown	GENERIC	MICROWAVE 2FT	Panel	18000	0.10	1	250	2.1	36.95	495.45	2.0	116.0

*Table 1: Total Site Data Table (*AGL = Above Ground Level)*

Note: Z Value represents the bottom tip height of the antenna

75% duty cycle is assumed for all AT&T antennas

C-Band antennas were calculated using AT&T's preferred conservative power reduction factor of 0.32

4.0 PREDICTED EMISSION LEVELS AND DISCUSSION

All calculations performed based upon the data listed for this facility have produced results that are above allowable limits for General Population and Occupational limits for exposure to RF emissions as specified by federal standards.

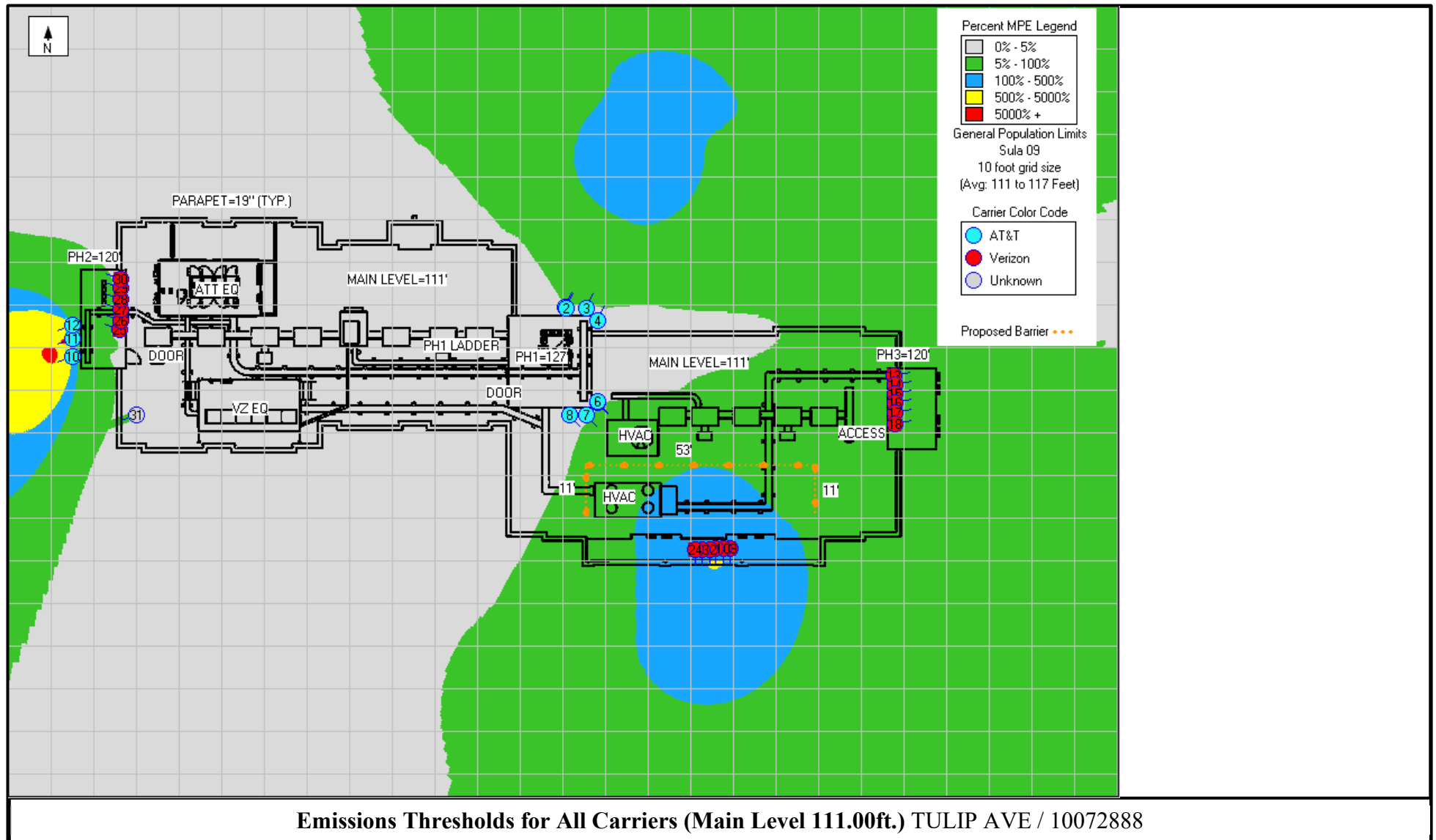
Maximum Predicted MPE Level on Site – AT&T Only:	% of MPE Limit:
Accessible General Population MPE Limits:	111.72%
Accessible Occupational MPE Limits:	22.34%

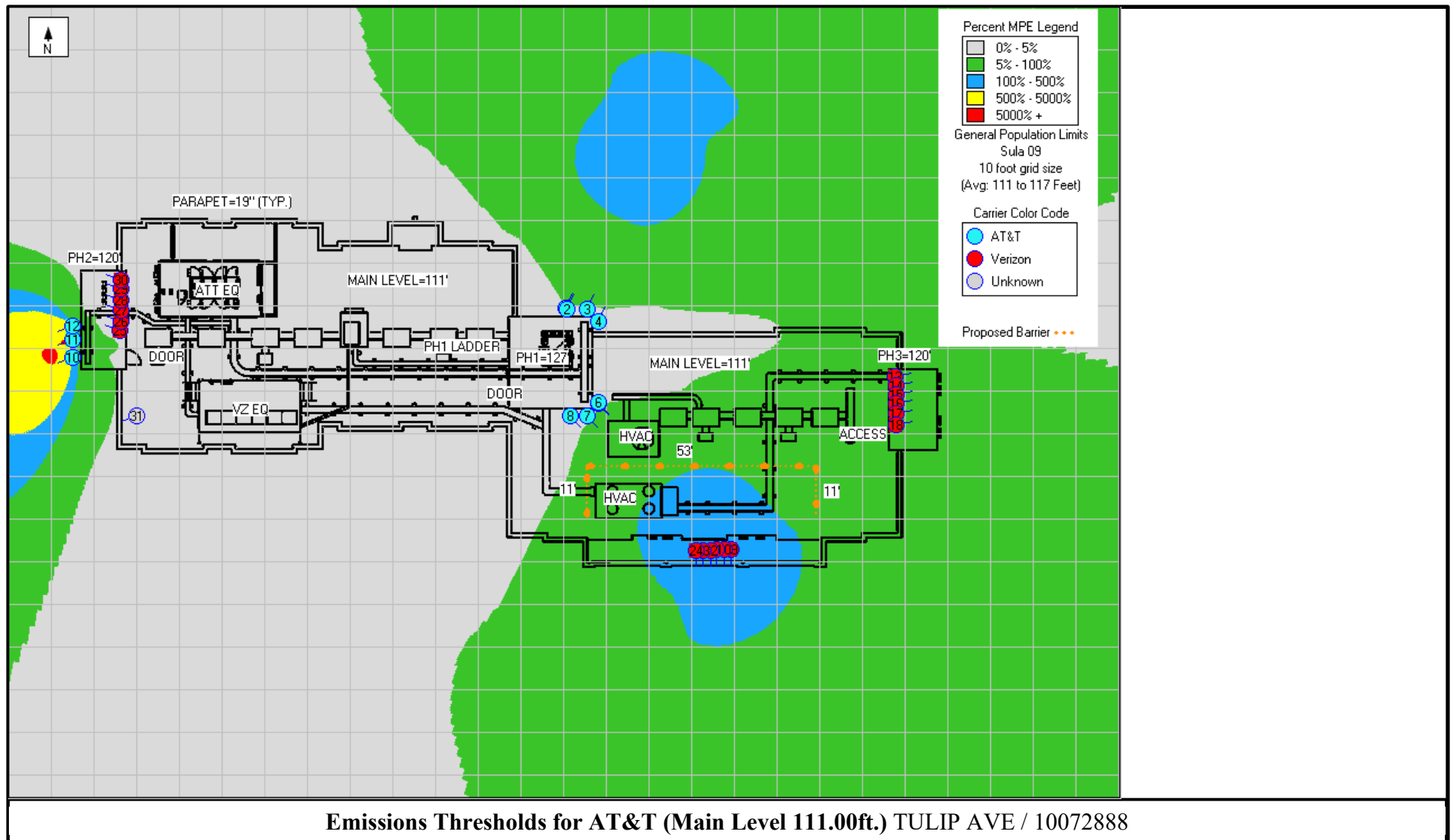
Maximum Composite Predicted MPE Level on Site – All Carriers:	% of MPE Limit:
Accessible General Population MPE Limits:	530.72%
Accessible Occupational MPE Limits:	106.14%

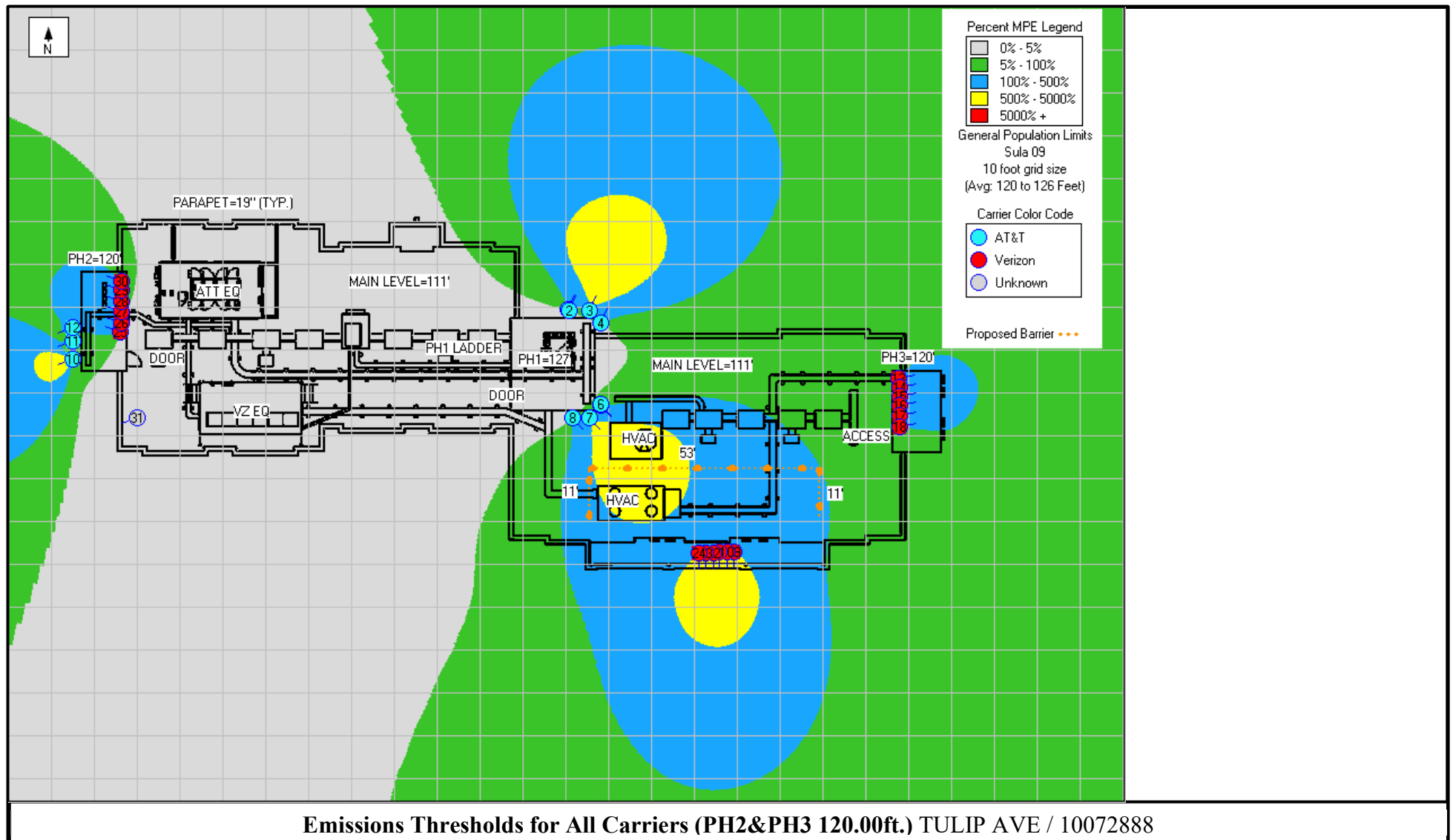
Maximum Predicted Ground Level MPE – AT&T Only:	% of MPE Limit:
Ground Level General Population MPE Limits:	0.91%
Ground Level Occupational MPE Limits:	0.18%

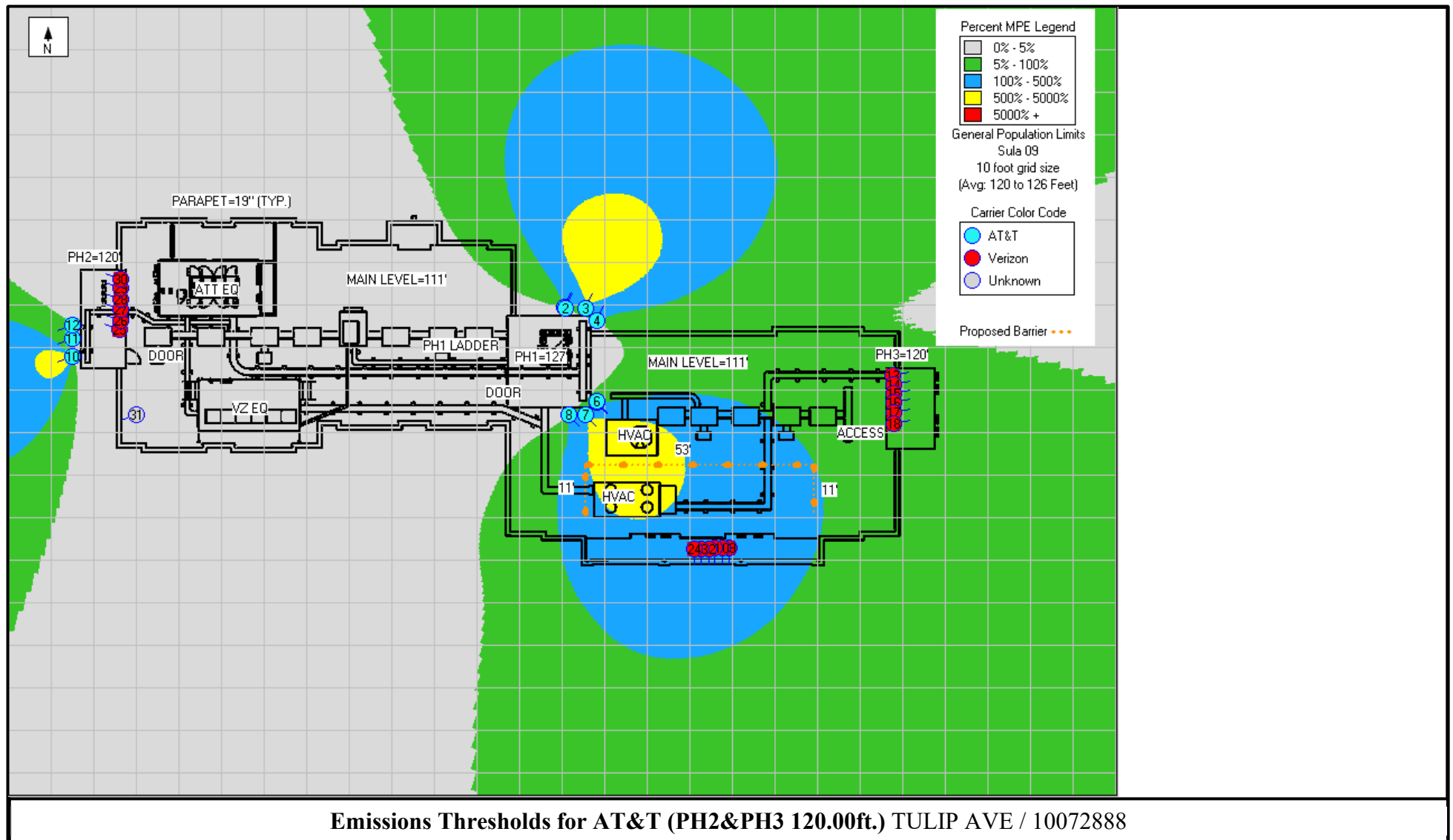
Maximum Predicted Ground Level MPE – All Carriers:	% of MPE Limit:
Ground Level General Population MPE Limits:	0.91%
Ground Level Occupational MPE Limits:	0.18%

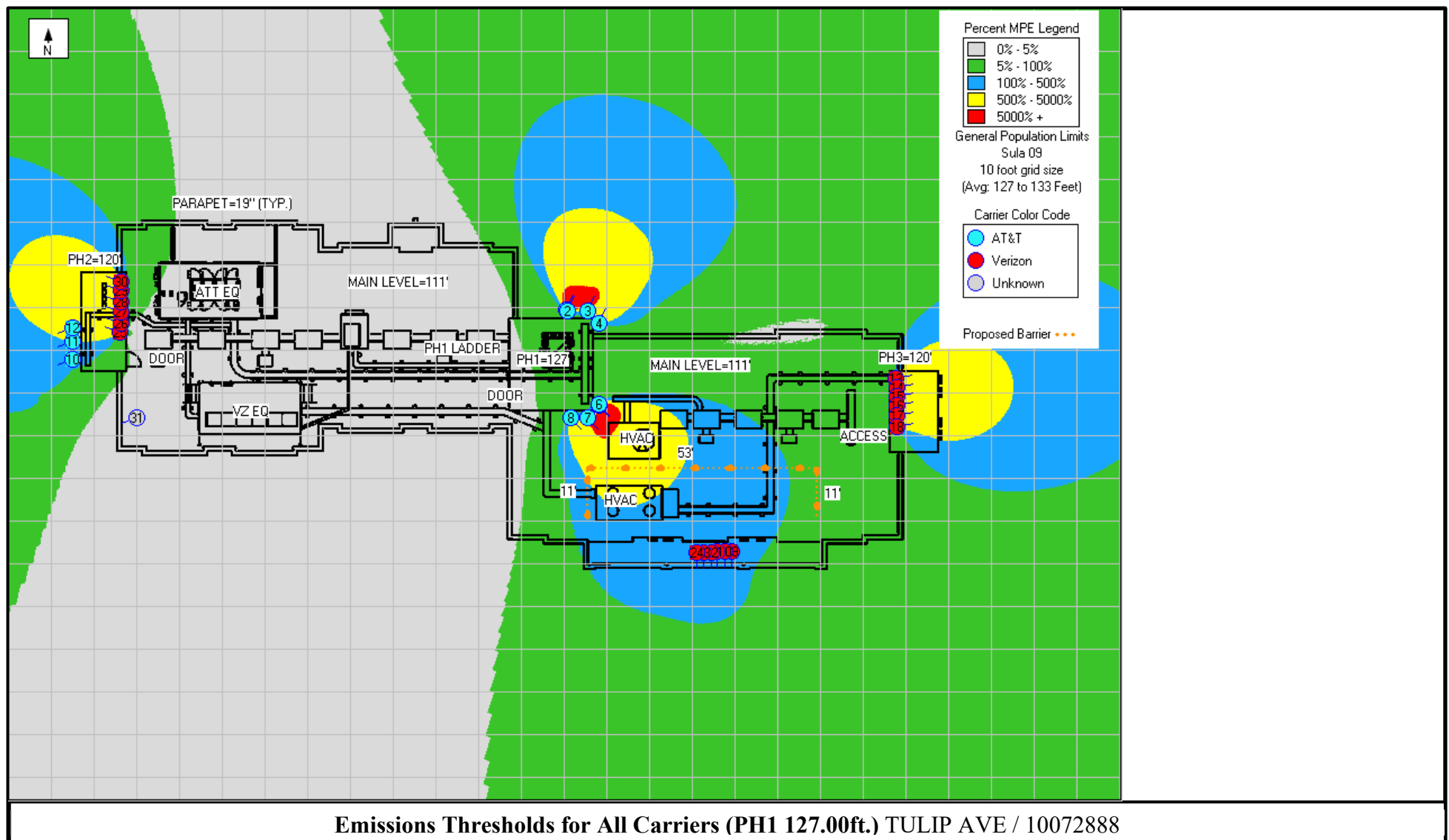
5.0 EMISSIONS DIAGRAMS

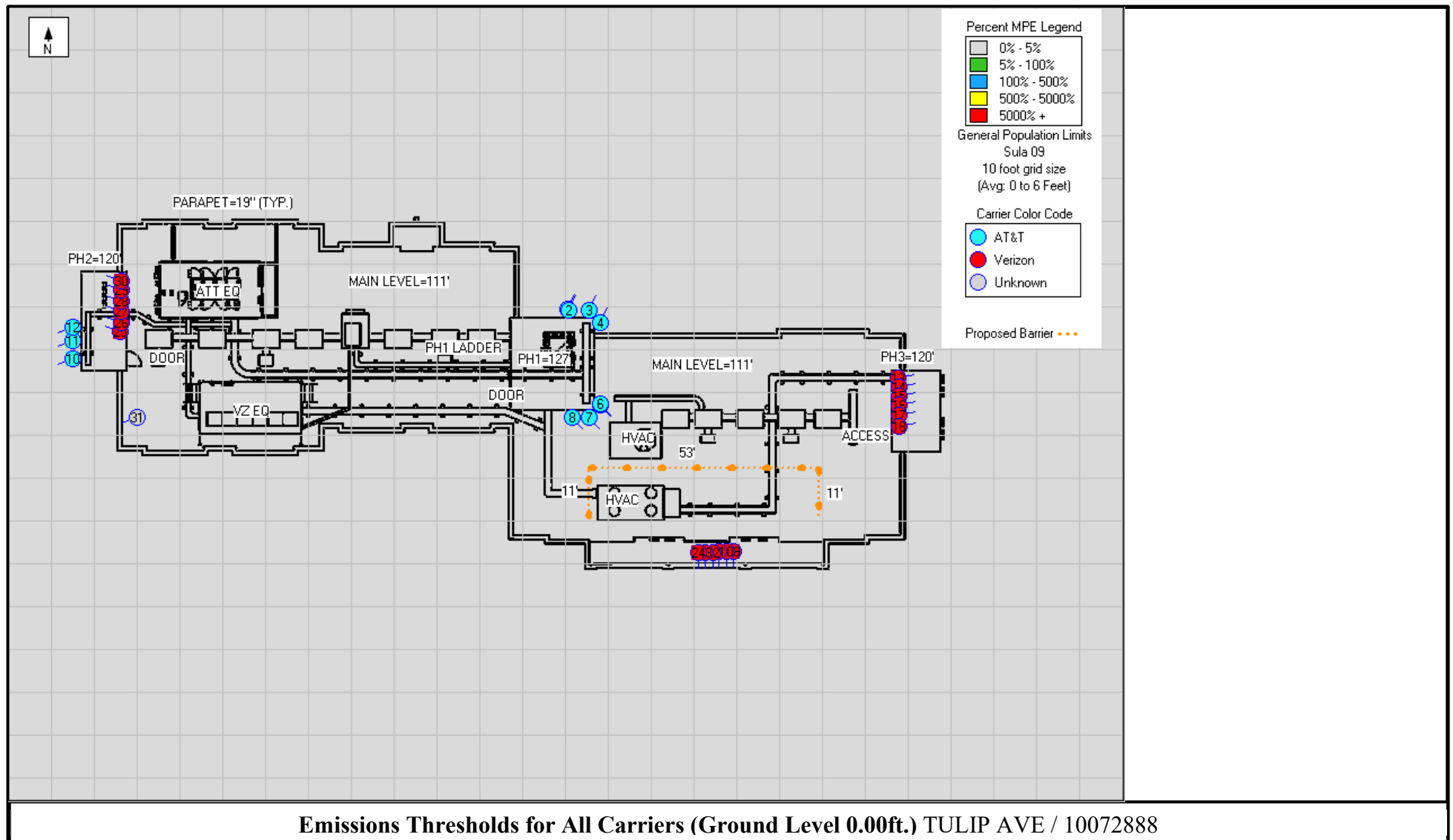












6.0 STATEMENT OF COMPLIANCE

Centerline conducted worst case modeling to determine whether the rooftop facility located at 7051 CARROL STREET in TAKOMA PARK, Maryland is in compliance with FCC Regulations.

6.1 STATEMENT OF AT&T MOBILITY COMPLIANCE

Based on the information analyzed, AT&T will be compliant with FCC Regulations once the mitigation measures recommended in this report are implemented.

6.2 RECOMMENDATIONS

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken							
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers	
PH Ladder	0	0	0	0	0	0	
Alpha	0	0	0	0	0	0	
Beta	0	12	0	0	0	X	
Gamma	0	0	0	0	0	0	

Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	15	0	0	0	0	X
Gamma	0	0	0	0	2	0	0	0	0	0

Beta:

- Install a 75' barrier (11'x53'x11' segments) with an estimated (12) stanchions. Install (12) Caution 2 signs on the barrier.

Notes:

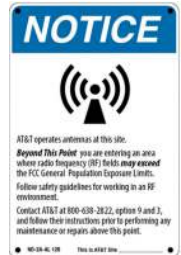
- Ensure all barriers are at least 6' away from any unprotected roof edges.
- The existing Caution 2 sign on PH1 ladder is not required and can be removed.
- The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.

7.0 FALL ARREST AND PARAPET INFORMATION

As per AT&T barrier policy, rooftop edges that are protected with a 39-inch parapet wall or guardrail are safe for work activity within six (6) feet of the edge. OSHA has stated that an existing 39-inch guardrail or parapet provides sufficient protection for employees. The height of the top rail or equivalent component of guardrail systems in new construction shall be at least 42 inches above the walking or working surface. It should also be noted that the height of the parapet or guardrail may be reduced to no less than 30 inches at any point provided the sum of the depth (horizontal distance) of the top edge, and the height of the top edge (vertical distance from the work surface to the top edge of the top member, is at least 48 inches. If there is no reason for working atop the roof, then edge protection is not required. In addition, workers may use personnel lifts or temporary fall protection measures to perform work within 6 feet of the roof edge in place of permanent edge protection. Reference: 29 CFR 1910.28, 29 CFR 1910.23 (NPRM-1990); OSHA Letters of Interpretation 2/9/83 and 3/8/9

APPENDIX A: RF SIGNAGE

AT&T RF Signage

Sign	Description	Sign	Description
	Information 1 Sign Gives guidelines on how to proceed and who to contact regarding areas that may exceed either the FCC's General Population or Occupational emissions limits.		Caution 2C Sign Gives specific information on how to proceed and who to contact regarding antennas that are façade mounted, concealed or on stand-alone structures.
	Blue Notice 1 Sign Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		Blue Notice 2 Sign Used to alert individuals that they are entering an area that may exceed the FCC's General Population emissions limits. To be used on barriers or antenna sectors as a hybrid of the Information 1 and Blue Notice 1 signs.
	Yellow Caution 1 Sign-Rooftop Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.		Yellow Caution 2 Sign-Rooftop Used to alert individuals that they are entering an area that may exceed the FCC's Occupational emissions limit. To be used on barriers or antenna sectors as a hybrid of the Information 1 and Yellow Caution 1 signs.
	Yellow Caution 2B Sign- Tower Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limits. Must be placed at the base of the tower to warn tower climbers of potential for exposure.		Warning 2 Sign Used to inform individuals that they are entering an area that may exceed the FCC's Occupational emissions limit by a factor of 10 or greater. Must be positioned such that persons approaching from any angle have ample warning to avoid the marked areas.

APPENDIX B: FCC GUIDELINES AND EMISSIONS THRESHOLD LIMITS

All power density values used in this report were analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General Population/Uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limit for the 700 and 800 MHz Bands is approximately 467 $\mu\text{W}/\text{cm}^2$ and 567 $\mu\text{W}/\text{cm}^2$ respectively, and the general population exposure limit for the 1900 MHz PCS and 2100 MHz AWS bands is 1000 $\mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure, have been properly trained in RF safety and can exercise control over their exposure. Occupational/Controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure, have been trained in RF safety and can exercise control over his or her exposure by leaving the area or by some other appropriate means. The Occupational/Controlled exposure limits all utilized frequency bands is five (5) times the FCC's General Public / Uncontrolled exposure limit.

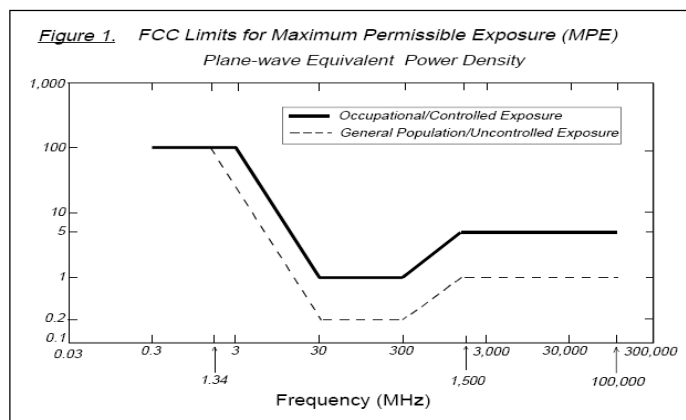
The FCC Mandates that if a site is found to be out of compliance with regard to emissions that any system operator contributing 5% or more to areas exceeding the FCC's allowable limits will be responsible for bringing the site into compliance.

Additional details can be found in FCC OET 65.

Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time [E] ² , [H] ² , or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time [E] ² , [H] ² , or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

* Plane-wave equivalent power density



APPENDIX C: CALCULATION METHODOLOGY

Centerline Communications, LLC has performed theoretical modeling using Waterford Consultants' RoofMaster™ 2020 Version 35.05.18.22 which uses a cylindrical model for conservative power density predictions within the near field of the antenna where the antenna pattern has not truly formed yet. Within this area power density values tend to decrease based upon an inverse distance function. At the point where it is appropriate for modeling to change from near-field calculations to far-field calculations the power decreases inversely with the square of the distance. This modeling technique is accurate with low antenna centerlines, such as rooftops, where persons can get close to the antennas and pass through fields in close proximity.

The modeling is based on worst-case assumptions for the number of antennas and transmitter power. No losses were included in the power calculations unless they were specifically provided for the project.

FAR FIELD MODEL

In OET-65, a far field model is presented to calculate the spatial peak power density. The RoofMaster™ implementation of this model incorporates antenna manufacturer's horizontal and vertical pattern data to determine the power density in all directions. Power density is calculated as follows:

$$S = \frac{13.05 P_{in} G}{R^2} \frac{\mu W}{cm^2}$$

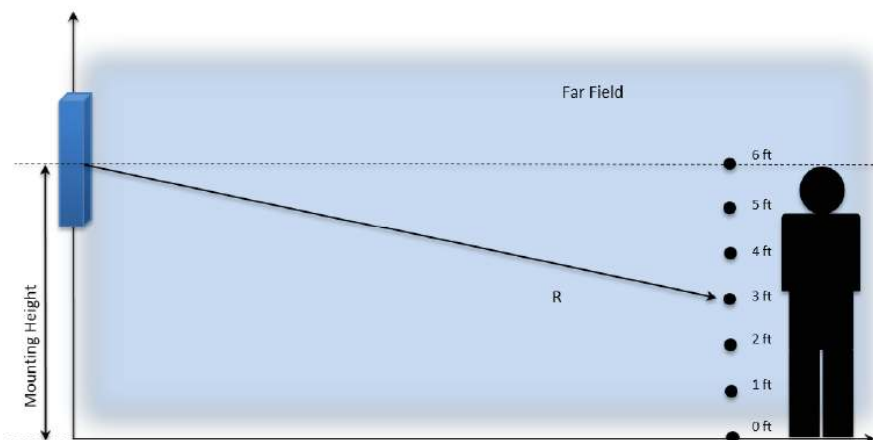
- Does not include 100% reflection factor
- Pin is Watts
- R is meters to study point
- G is gain to study point as specified in manufacturer horizontal and vertical patterns

A worst-case prediction is described in OET-65 where field strength may double due to 100% reflection of the incoming radiation. Considering an EPA recommendation that a multiplier of 1.6 is a more realistically representation of this effect is rewritten as follow:

$$S_{FF} = \frac{33.4 \cdot P_{in} \cdot G_{dBd}}{R^2} \quad (\mu W/cm^2)$$

This model yields the power density at a single point in space. In order to determine the spatial power density for comparison to the FCC limits, the average of several points calculated within the human profile (0 to 6 feet) must be conducted.

RoofMaster™ calculates seven power density values between 0 and 6 feet above the specified study plane and performs a linear spatial average.



Predicted power densities are displayed as a percentage of the applicable FCC standards.

Power Reduction Formula for Reducing Maximum Safety Distance Length

$$(\mathbf{R}_{\text{reduced}}/\mathbf{R}_{\text{max}}) = 0.99 * (\mathbf{P}_{\text{reduced}}/\mathbf{P}_{\text{max}})$$

$$\mathbf{P}_{\text{max}} = 200\text{W (Nominal Peak power of AEQK)}$$

$$\mathbf{R}_{\text{max}} = \text{Lateral Compliance Distance of AEQK}$$

$$\mathbf{P}_{\text{reduced}} = ?$$

$$\mathbf{R}_{\text{reduced}} = \text{Actual Lateral Distance between AEQK and Bldg. X}$$

APPENDIX D: CERTIFICATIONS

I, Zyotty Thamsil, preparer of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T's RF Exposure: Responsibilities, Procedures & Guidelines document.

Zyotty Thamsil

8/11/2022

I, Yasir Alqadhili, reviewer and approver of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in AT&T's RF Exposure: Responsibilities, Procedures & Guidelines document.

Yasir Alqadhili

8/11/2022

APPENDIX E: PROPRIETARY STATEMENT

This report was prepared for the use of AT&T Mobility, LLC to meet requirements specified in AT&T's corporate RF safety guidelines. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by Centerline Communications, LLC are based solely on the information provided by AT&T Mobility and all observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to Centerline Communications, LLC so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

September 14, 2022

Montgomery County
Technology & Enterprise Business Solutions
100 Maryland Avenue, Room 200
Rockville, MD 20850

Re: New Cingular Wireless PCS, LLC (“AT&T”) building permit application
 (“Application”) for collocation at the existing wireless telecommunications facility
 located at 7051 Carroll Ave, Takoma Park, MD 20912

Dear Tower Committee:

AT&T is seeking to modify the exiting wireless site at the above-referenced address. We are submitting this application as an eligible facilities request under Section 6409, referenced below. Please find enclosed the following documents in support of our application to obtain the building permit:

1. Online Application
2. Excerpt from the FCC Order regarding 6409
3. Signed and Stamped Construction Drawings
4. RF Frequency Study
5. Area Map
6. Manufacturer’s Specification Sheets
7. Tower Committee Review Fee

Section 6409 of the Federal Middle Class Tax Relief and Job Creation Act (“Section 6409”) was adopted in 2012. Under Section 6409, your city retains discretionary zoning review over the construction of *new* towers, but simple collocations and/or equipment upgrades at existing telecommunications facilities must be approved. The new law provides that:

“**a State or local government** may not deny, and **shall approve**, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.”
(Emphasis added.)

The federal law defines an “eligible facilities request” as “(A) **collocation of new transmission equipment**; (B) **removal of transmission equipment**; or (C) **replacement of transmission equipment**.” (Emphasis added.)

Also, the Federal Communications Commission issued a Wireless Infrastructure Report and Order on October 17, 2014 (“FCC Order”) which established regulations that clarify and streamline the municipal approval process for eligible facilities requests under Section 6409. A copy of the FCC Order is enclosed herewith.

The FCC Order clarifies that municipal review of an eligible facilities request is **limited to determining whether the request falls within Section 6409**:

“a State or local government may require the applicant to provide documentation or information **only to the extent reasonably related to determining whether the request meets the requirements of this section** [Section 6409]. A State or local government **may not require an applicant to submit any other documentation**, including but not limited to documentation intended to illustrate the need for such wireless facilities or to justify the business decision to modify such wireless facilities.”⁴⁷ C.F.R. 1.40001(c)(1) (Emphasis added).

AT&T’s Application is an Eligible Facilities Request under Section 6409

AT&T’s application qualifies as an eligible facilities request under Section 6409 because the proposed installation involves “a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.”

As shown on the plans prepared by JACOBS dated August 23, 2022 AT&T’s proposed installation consist principally of the following elements:

Swapping Antennas and related ancillary equipment. There will be no change to the height of the structure or the total overall height.

Accordingly, AT&T’s installation involves **the “replacement of transmission equipment” that will not increase the height of the tower nor the dimensions of the equipment compound**. As a result, the installation “does not substantially change the physical dimensions of such tower or base station.” Therefore, these proposed equipment upgrades constitute an “eligible facilities request” under Section 6409 and must be approved.

Timeline for Review and Approval

We would like to highlight an important timing requirement for processing this application. The FCC Order determined that **a municipality must act on an eligible facilities request within sixty (60) days of receiving the application**. ⁴⁷ C.F.R. 1.40001(c)(2) (Emphasis added). (Note, the sixty (60)-day period is also known as the “Shot Clock”). Thus, the city must approve this application within sixty (60) days of its receipt. The FCC Order provides that upon a municipality’s failure to act prior to expiration of the Shot Clock, the **“request shall be deemed granted”** and AT&T will be legally entitled to proceed with construction. ⁴⁷ C.F.R. 1.40001(c)(4) (Emphasis added).

Note that the FCC Order does allow the Shot Clock to be tolled if an application is incomplete. However, in order to do so, a municipality must provide written notice that the application is incomplete within thirty (30) days of the submittal. ⁴⁷ C.F.R. 1.40001(c)(3)(i). The notice must “clearly and specifically” describe the missing documents or information, ⁴⁷ C.F.R. 1.40001(c)(3)(i), and, as previously mentioned, such documentation must be necessary to the

determination of whether the application qualifies as an eligible facilities request. If the municipality requests additional information after the first thirty (30) days have passed, we will still provide any “reasonably related” information allowed under the FCC Order, but the Shot Clock will not be tolled.

In light of the foregoing, AT&T respectfully requests that its proposed wireless site modification be approved pursuant to Section 6409.

If Montgomery County believes that AT&T’s application does not qualify as an eligible facilities request under Section 6409, please let me know immediately. Otherwise, if you have any questions, please feel free to call or email me. Thank you for your cooperation.

Sincerely,

Andrea Holzer

Andrea Holzer
Site Acquisition Manager
Jacobs Telecommunications
714-702-6637
Andrea.Holzer@Jacobs.com

PROJECT DESCRIPTION

AT&T WIRELESS PROPOSES TO MODIFY AN EXISTING WIRELESS INSTALLATION. THE SCOPE WILL CONSIST OF THE FOLLOWING:

ROOFTOP SOW

- DECOM (4) EXISTING 1-5/8" COAX AND LEAVE IN-PLACE
- DECOM (2) EXISTING 7/8" COAX AND LEAVE IN-PLACE
- REMOVE (3) EXISTING KATHREIN 742 264 ANTENNAS
- REMOVE (E) TMAS/DIPLEXERS IN POS. 1
- USE EXISTING SPARE 6 AWG DC TRUNKS

- INSTALL (3) PROPOSED AEQK ANTENNAS IN POS. 1
- INSTALL (3) PROPOSED AEQU ANTENNAS IN POS. 1

GROUND SOW

- DECOM EXISTING UMTS
- REMOVE EXISTING 9412 CABINET
- RELOCATE EVERYTHING INSIDE THE EXISTING 9412 CABINET TO THE PROPOSED FLX21-V2 CABINET

- INSTALL (1) PROPOSED 48V RECTIFIER IN (E) NETSURE 7100 PP
- INSTALL (4) PROPOSED DEKA FAHRENHEIT HT170ET BATTERIES
- INSTALL (1) PROPOSED FLX21-V2 CABINET
- INSTALL (1) PROPOSED FSM4 INSIDE PROPOSED FLX21-V2 CABINET
- INSTALL (1) PROPOSED 100A BREAKER
- INSTALL (6) PROPOSED 40A BREAKERS
- INSTALL (2) PROPOSED 30A BREAKERS

- NO SITE/CIVIL WORK

SITE INFORMATION	
LANDLORD:	TAKOMA TOWER LP
LANDLORD SITE NUMBER:	N/A
SITE NAME:	TULIP AVE
USID NUMBER:	3939
FA NUMBER:	10072888
SITE ADDRESS:	7051 CARROL STREET TAKOMA PARK, MD 20912
COUNTY:	MONTGOMERY
LATITUDE (NAD 83):	N 38° 58' 29.089"
LONGITUDE (NAD 83):	W 77° 00' 37.573"
RAD CENTER:	107', 115' & 129' AGL
SITE ACQUISITION CONTACT:	ANDREW CAPACI Andrew.Capaci@jacobs.com
RF ENGINEER:	SANDEEP GUPTA AA913P@att.com
C&E MANAGER:	STEVEN SAFIRE SS0091@att.com
JURISDICTION:	MONTGOMERY COUNTY
APPLICANT/LESSEE:	AT&T 7150 STANDARD DRIVE SUITE A HANOVER, MD 21076

CONTACT INFORMATION	
ENGINEER:	JACOBS TELECOMMUNICATIONS, INC. 7150 STANDARD DRIVE, SUITE B HANOVER, MD 21076
CONTACT:	LEAH WOOLLY
PHONE:	443.230.4400x113

LOCATION MAPS

VICINITY MAP	LOCAL MAP
This map shows the broader context of Tacoma, Washington. Major highways like I-5, I-90, and SR-520 are visible. Landmarks such as the University of Washington Tacoma, Tacoma Community College, and various parks are labeled. A black dot on Tulip Avenue is highlighted, with a line pointing to a label 'TULIP AVE'.	This map provides a detailed view of the area around Tulip Avenue. It shows local streets, businesses, and landmarks. A black dot on Tulip Avenue is highlighted, with a line pointing to a label 'TULIP AVE'.
NO SCALE	

DRIVING DIRECTIONS

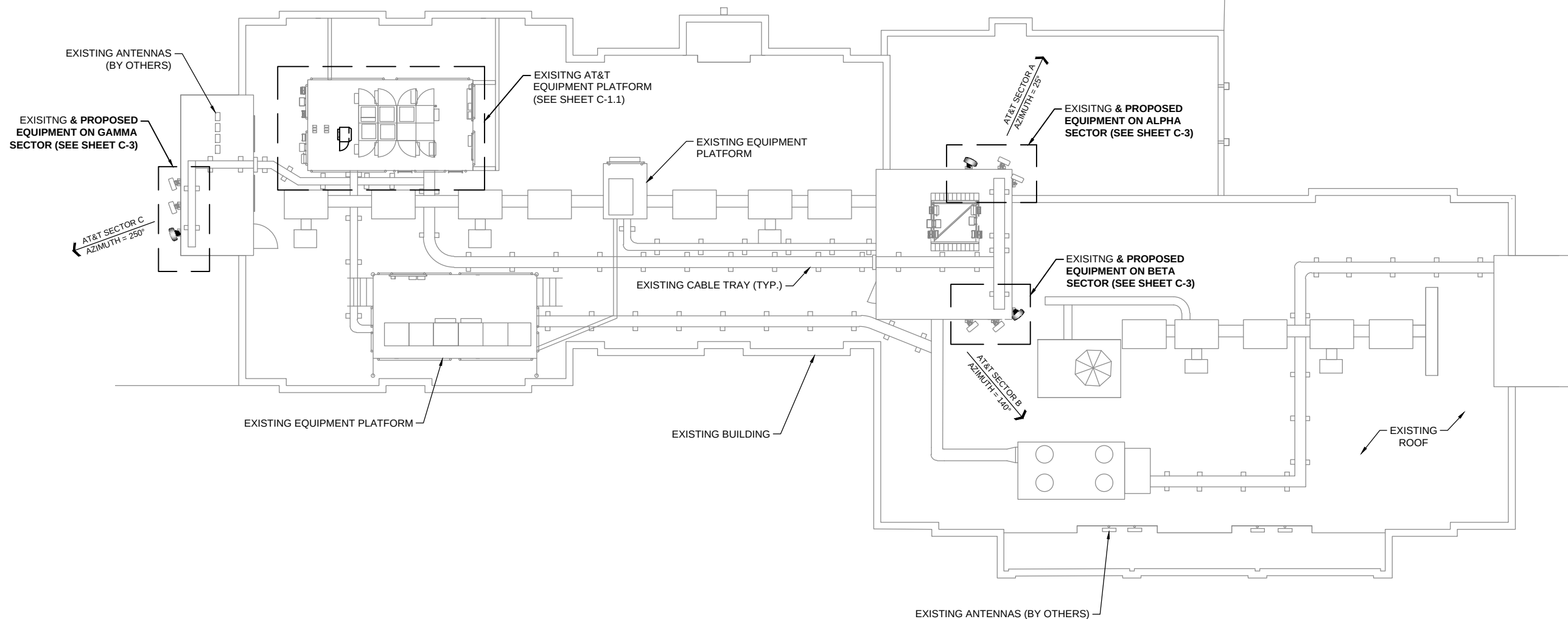
DIRECTIONS FROM AT&T OFFICE: START OUT FROM 7150 STANDARD DR, HANOVER MD HEAD SOUTHWEST TOWARD STANDARD DR. TURN LEFT TOWARD STANDARD DR. TURN RIGHT ONTO STANDARD DR. TURN LEFT ONTO PARKWAY DR. TURN RIGHT ONTO PARK CIR DR. TURN LEFT ONTO COCA COLA DR. SLIGHT RIGHT TO MERGE ONTO MD-100 W TOWARD ELLICOTT CITY MERGE ONTO MD-100 W TAKE THE EXIT ONTO I-95 S TOWARD WASHINGTON TAKE EXIT 27 W TO MERGE ONTO I-495 W TOWARD SILVER SPRING TAKE EXIT 28B TO MERGE ONTO MD-650 S/NEW HAMPSHIRE AVE TOWARD TAKOMA PARK MERGE ONTO MD-650 S/NEW HAMPSHIRE AVE. SLIGHT RIGHT TOWARD MD-320 S/PINEY BRANCH RD. MERGE ONTO MD-320 S/PINEY BRANCH RD. TURN LEFT ONTO CARROLL AVE. TURN LEFT,TURN LEFT DESTINATION WILL BE ON THE RIGHT.

[illegible]

T-1



- NOTES:**
1. PLAN BASED ON AS-BUILT DRAWINGS ISSUED BY B+T GRP ON 08/12/2021.
CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND
LOCATION/ORIENTATION OF EXISTING EQUIPMENT.
 2. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER
AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.



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7150 STANDARD DR., SUITE B
HANOVER, MD 21076
443.230.4400x113



APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

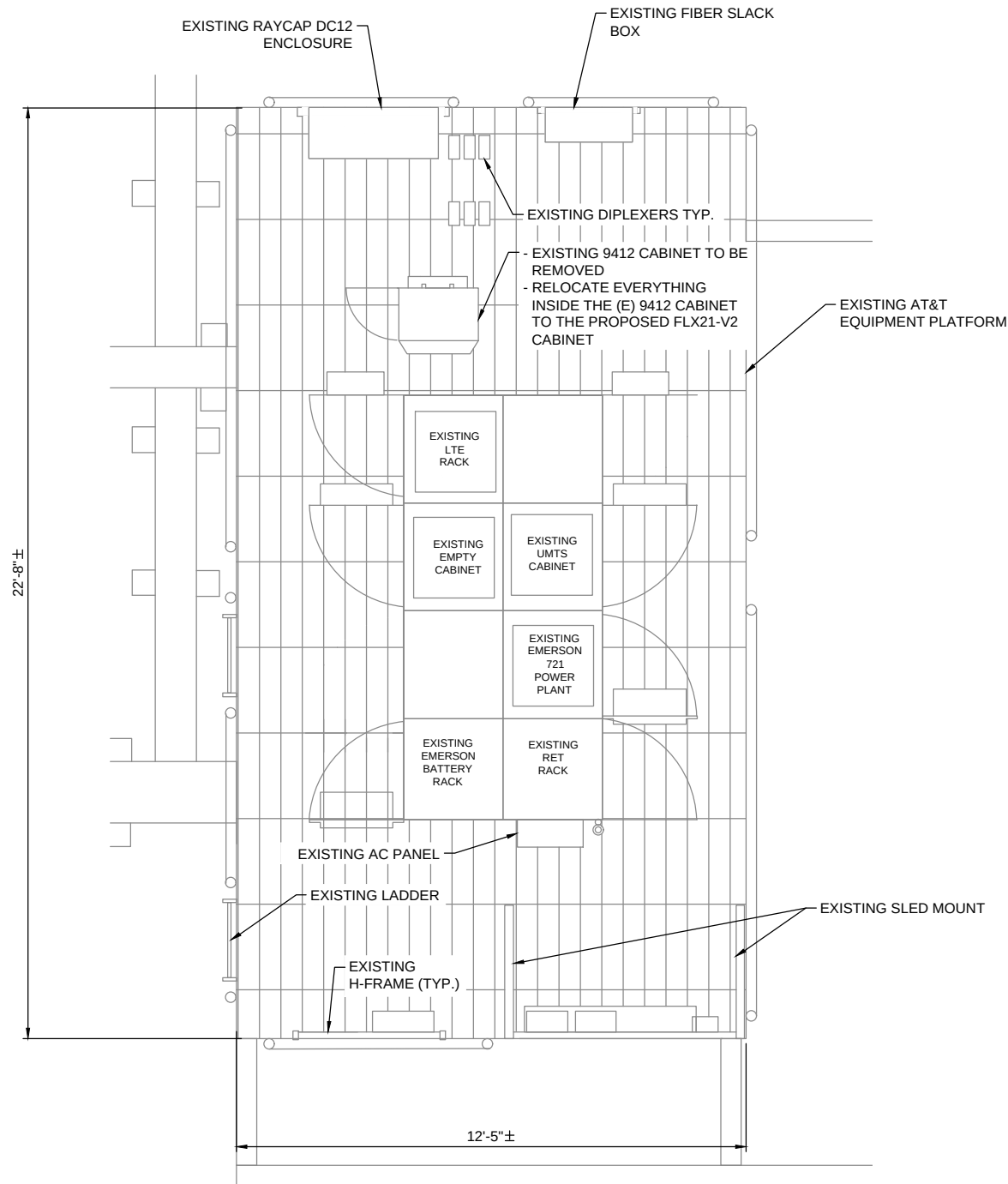
SUBMITTALS		
2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
B	06/01/22	REVISION
A	04/27/22	ISSUED FOR REVIEW

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ARE SPECIFICALLY ALLOWED.

FA# 10072888
USID# 3939
TULIP AVE
7061 CARROL STREET
TAKOMA PARK, MD 20912

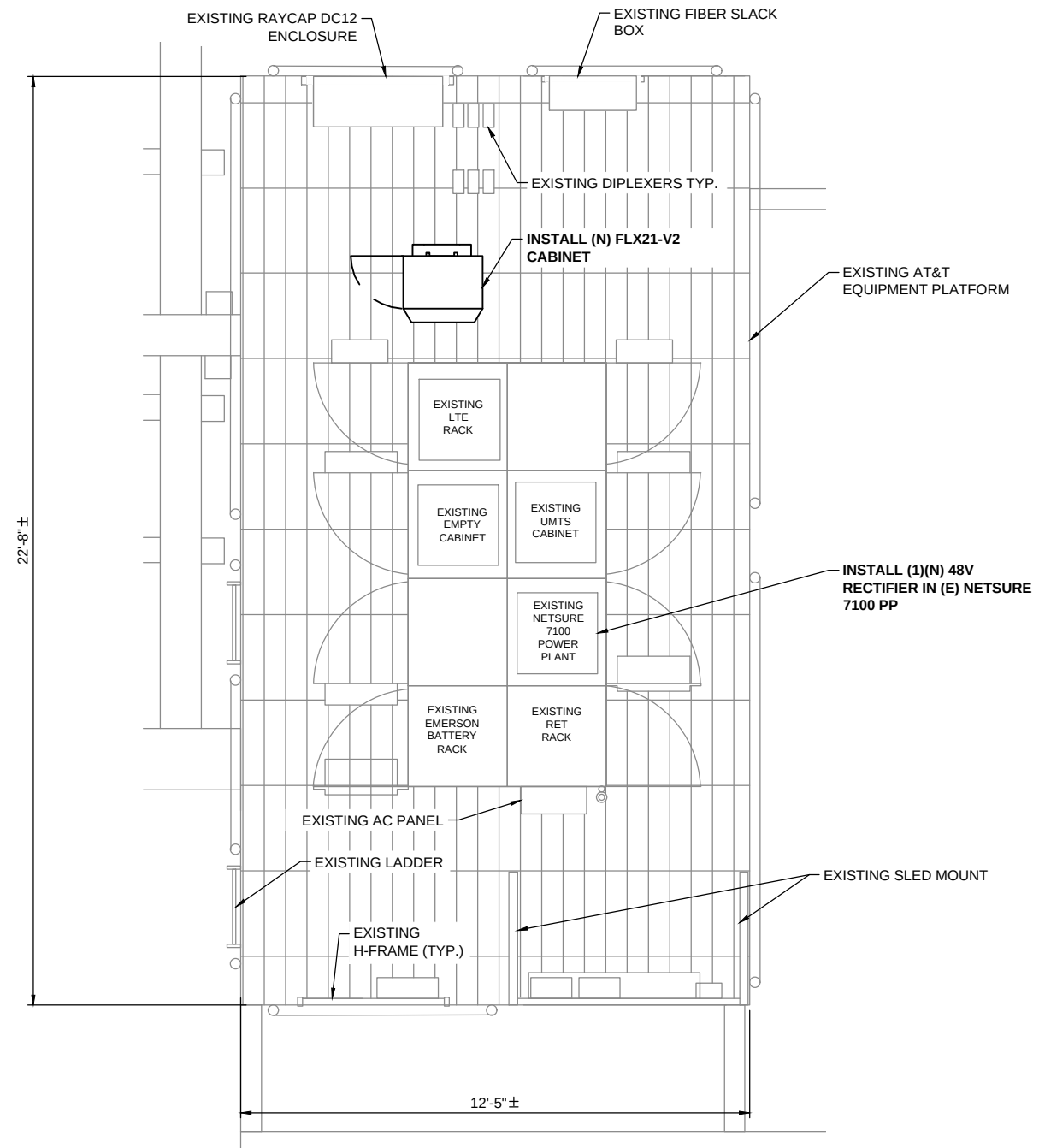
ROOFTOP PLAN

C-1



GROUND SCOPE OF WORK:

- DECOM (E) UMTS
- REMOVE (E) 9412 CABINET
- INSTALL (1)(N) 48V RECTIFIER IN (E) NETSURE 7100 PP
- INSTALL (4)(N) DEKA FAHRENHEIT HT170ET BATTERIES IN (E) BATTERY RACK
- INSTALL (N) FLX21-V2 CABINET
- RELOCATE EVERYTHING INSIDE THE (E) 9412 CABINET TO THE (N) FLX21-V2 CABINET
- INSTALL (N) FSM4 INSIDE (N) FLX21-V2 CABINET
- INSTALL (1)(N) 100A BREAKER FOR (N) FLX21-V2 CABINET
- INSTALL (3)(N) 40A BREAKERS FOR (N) AEQK
- INSTALL (3)(N) 40A BREAKERS FOR (N) AEQU
- INSTALL (2)(N) 30A BREAKERS FOR (E) FSM4 CHASSIS (CBAND)



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APPROVALS

LANDLORD _____
LEASING _____
R.F. _____
ZONING _____
CONSTRUCTION _____
A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS

2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
B	06/01/22	REVISION
A	04/27/22	ISSUED FOR REVIEW

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FA# 10072888

USID# 3939

TULIP AVE

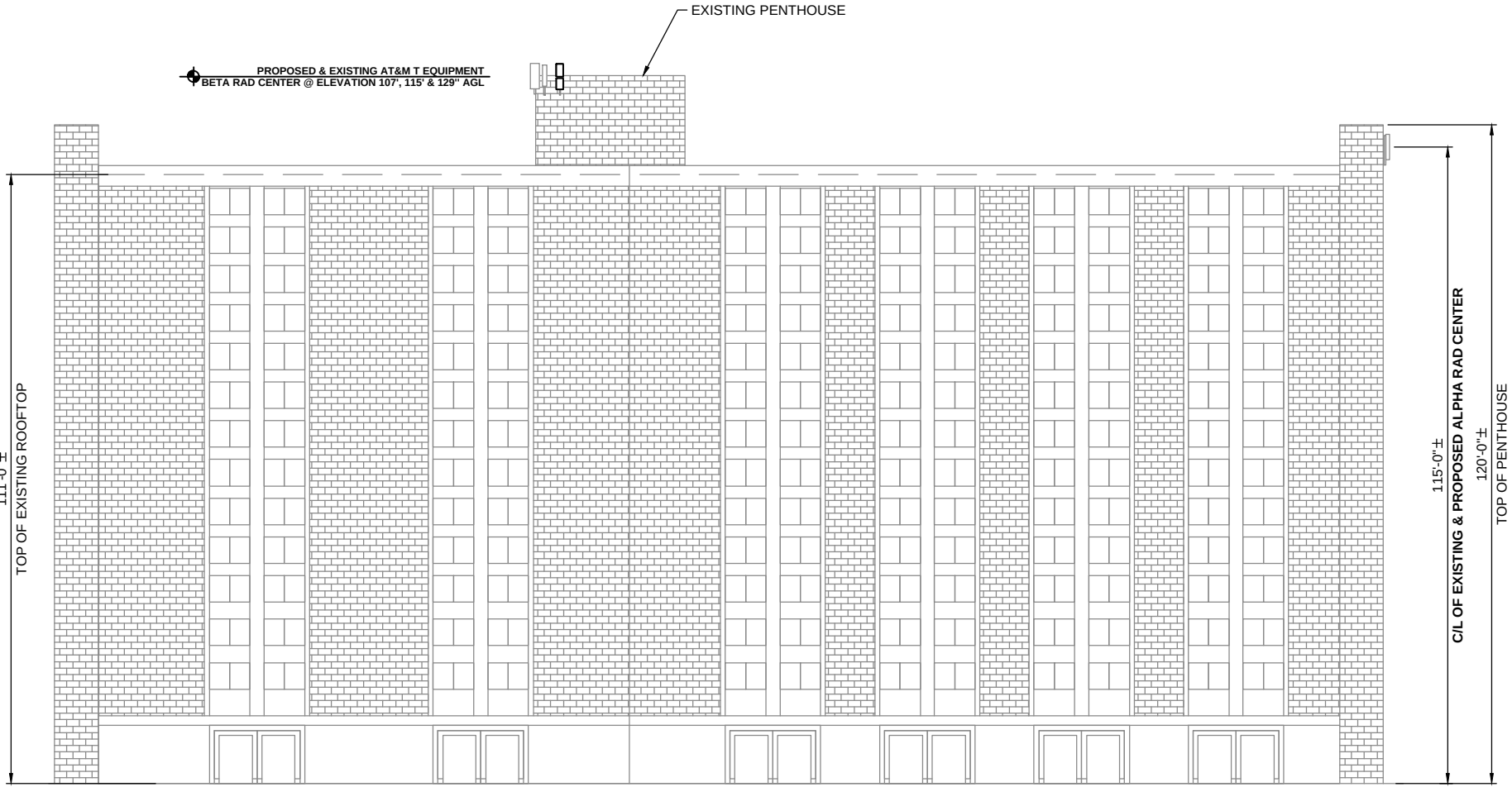
7061 CARROL STREET
TAKOMA PARK, MD 20912

GROUND EQUIPMENT LAYOUT

C-1.1

NOTES:

- EXISTING TOWER INFORMATION IS PROVIDED FOR REFERENCE ONLY. JACOBS TELECOMMUNICATIONS, INC. IS NOT RESPONSIBLE FOR THE ANALYSIS/DESIGN OF THE EXISTING TOWER, ITS CONNECTIONS & FOUNDATIONS. A STRUCTURAL ANALYSIS OF THE EXISTING TOWER AND FOUNDATIONS PERFORMED BY OTHERS. CONTRACTOR SHALL REFER TO THE LATEST STRUCTURAL ANALYSIS REPORT. MODIFICATIONS TO THE TOWER OR FOUNDATION THAT ARE NEEDED MUST BE PERFORMED PRIOR TO THE INSTALLATION OF THE EQUIPMENT SHOWN ON THE DRAWINGS.
- CONTRACTOR SHALL VERIFY THE EXISTING ANTENNA CENTERLINE HEIGHT ABOVE GROUND LEVEL. PROPOSED ANTENNA CENTERLINE SHALL MATCH EXISTING.



NOTES:

- ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUNDING KITS. FOLLOW THE MANUFACTURER'S RECOMMENDATIONS.
 - GROUNDING AT THE ANTENNA LEVEL.
 - GROUNDING AT MID LEVEL. TOWERS WHICH ARE OVER 200', ADDITIONAL CABLE ROUNDING REQUIRED.
 - GROUNDING AT BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
 - GROUNDING OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
 - GROUNDING INSIDE THE EQUIPMENT SHELTER AT THE ENTRY PORT.
- ALL PROPOSED GROUNDING BAR DOWNLEADS ARE TO BE TERMINATED TO THE EXISTING ADJACENT GROUNDING BAR DOWNLEADS A MINIMUM DISTANCE OF 4'-0" BELOW GROUNDING BAR. TERMINATIONS MAY BE EXOTHERMIC OR COMPRESSION.
- THE CONTRACTORS SHALL BE RESPONSIBLE FOR VERIFYING THE ANTENNA AND THE COAX CONFIGURATION IS THE CORRECT MAKE AND MODELS, PRIOR TO INSTALLATION.
- ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A SECTOR ANTENNA MOUNT, INCLUDING ALL HARDWARE, WHEN APPLICABLE.
- ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S SPECIFICATION & RECOMMENDATIONS.
- CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.

ANTENNA MOUNTING NOTES:

- DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/EIA/TIA-222 "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES" OR APPLICABLE LOCAL CODES. DESIGN WIND LOADING OBTAINED FROM ANSI/TIA-222-G, OR THE LATEST VERSION.
- ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS OTHERWISE NOTED.
- ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS OTHERWISE NOTED.
- DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
- ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK NUTS, DOUBLE NUTS AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
- ANTENNA CONTRACTOR SHALL ENSURE ALL ANTENNA MOUNTING PIPES ARE PLUMB AND LEVEL.
- MULTI PORT ANTENNAS: TERMINATE UNUSED ANTENNA PORTS WITH CONNECTOR CAP & WEATHERPROOF THOROUGHLY. JUMPERS FROM THE TMA'S MUST TERMINATE TO OPPOSITE POLARIZATION'S IN EACH SECTOR.
- CONTRACTOR SHALL RECORD THE SERIAL #, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE DOCUMENTATION TO AT&T.
- CONTRACTOR SHALL INSTALL ANTENNA PER MANUFACTURER'S RECOMMENDATION FOR INSTALLATION AND GROUNDING.

COAXIAL ANTENNA CABLE NOTES:

- TYPES AND SIZES OF THE ANTENNA CABLE ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
- CONTRACTOR SHALL VERIFY THE DOWN-TILT OF EACH ANTENNA WITH A DIGITAL LEVEL.
- CONTRACTOR TO CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO "ANTENNA SYSTEM LABELING STANDARD" ND-00027, REFER TO THE LATEST VERSION.
- ALL JUMPERS TO THE ANTENNAS FROM THE MAIN TRANSMISSION LINE WILL BE 1/2" DIA. LDF AND SHALL NOT EXCEED 6'-0".
- ALL COAXIAL CABLE WILL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE, IN AN APPROVED MANNER, AT DISTANCES NOT TO EXCEED 4'-0" O.C.
- CONTRACTOR MUST FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS REGARDING BOTH THE INSTALLATION AND GROUNDING OF ALL COAXIAL CABLES, CONNECTORS, ANTENNAS, AND ALL OTHER EQUIPMENT.
- WEATHERPROOF ALL ANTENNA CONNECTORS WITH SELF AMALGAMATING TAPE. WEATHERPROOFING SHALL BE COMPLETED IN STRICT ACCORDANCE WITH AT&T STANDARDS.
- CONTRACTOR SHALL GROUND ALL EQUIPMENT, INCLUDING ANTENNAS, RET MOTORS, TMA'S, COAX CABLES, AND RET CONTROL CABLES AS A COMPLETE SYSTEM. GROUNDING SHALL BE EXECUTED BY QUALIFIED WIREMEN IN COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND RECOMMENDATION.
- CONTRACTOR SHALL PROVIDE STRAIN-RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES, COAX CABLES, AND RET CONTROL CABLES. CABLE STRAIN-RELIEFS AND CABLE SUPPORTS SHALL BE APPROVED FOR THE PURPOSE. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

FIBER & POWER CABLE MOUNTING NOTES:

- CABLE TO BE SUPPORTED USING 1/2" SNAP-INS (PIM RATED)(SNAPTEK POLYMERS OR EQUIVALENT) OR 1/2" BUTTERFLY HANGERS (PIM RATED)(SNAPTEK POLYMERS OR EQUIVALENT) OR ENGINEER APPROVED EQUAL..
- CABLE TO BE SUPPORTED EVERY 3'.
- ALL SNAP-INS, RUBBER CABLE INSERTS, AND MOUNTING HARDWARE FOR FIBER AND DC CABLES SHALL BE SUPPLIED FROM ROSENBERGER.
- RRUS TO BE INSTALLED WITHIN 16.4' (5.0 METERS) OF THE SURGE SUPPRESSOR. (CONTRACTOR TO FIELD VERIFY).

TORQUE REQUIREMENTS:

- ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
- ALL RF CONNECTIONS, GROUNDING HARDWARE AND ANTENNA HARDWARE SHALL HAVE A TORQUE MARK INSTALLED IN A CONTINUOUS STRAIGHT LINE FROM BOTH SIDES OF THE CONNECTION.
 - RF CONNECTION BOTH SIDES OF THE CONNECTOR.
 - GROUNDING AND ANTENNA HARDWARE ON THE NUT SIDE STARTING FROM THE THREADS TO THE SOLID SURFACE. EXAMPLE OF SOLID SURFACE: GROUND BAR, ANTENNA BRACKET METAL.
- ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).
- ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).
- ALL GROUNDING HARDWARE SHALL TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUND IS NO LONGER LOOSE.
- ALL DIN TYPE CONNECTIONS ARE TO BE TORQUED TO 18-22 LB-FT (24.4 - 29.8 NM).
- ALL N TYPE CONNECTIONS ARE TO BE TORQUED TO 15-20 LB-IN (1.7 - 2.3 NM).



APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

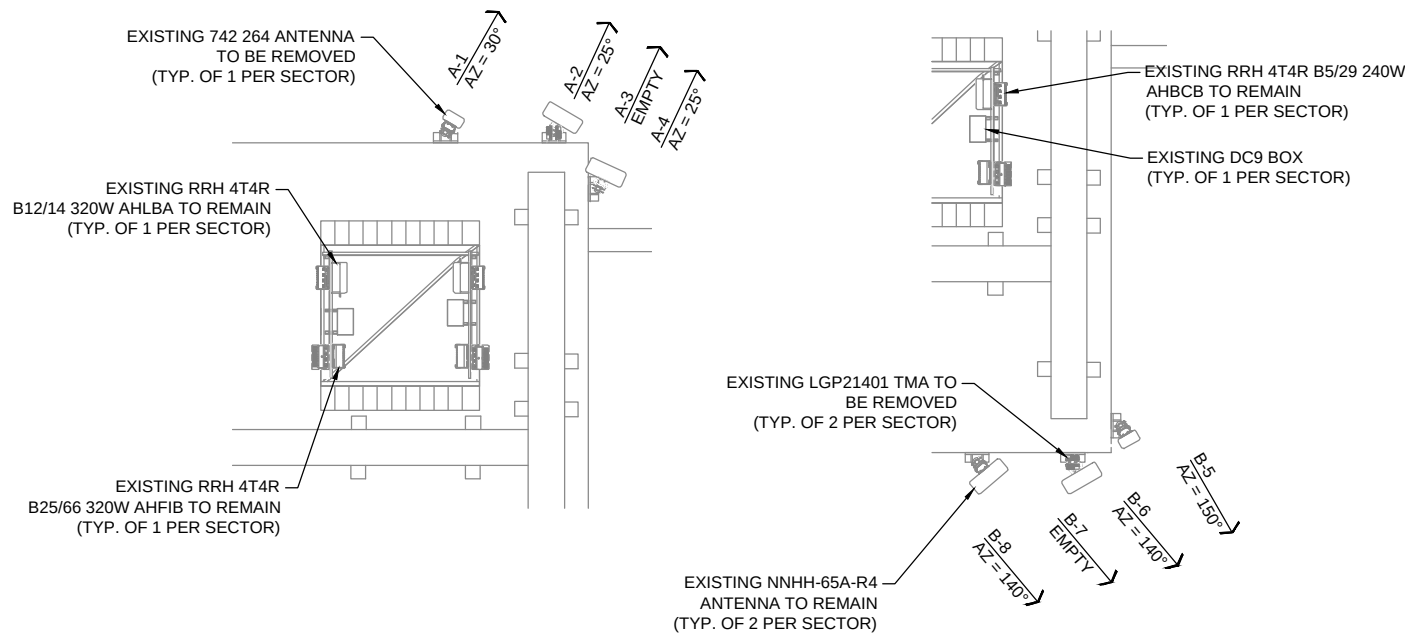
SUBMITTALS			
2	08/23/22	ISSUED	
1	06/13/22	REVISION	
0	06/01/22	ISSUED	
B	06/01/22	REVISION	
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USID# 3939
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TAKOMA PARK, MD 20912

SITE ELEVATION

C-2

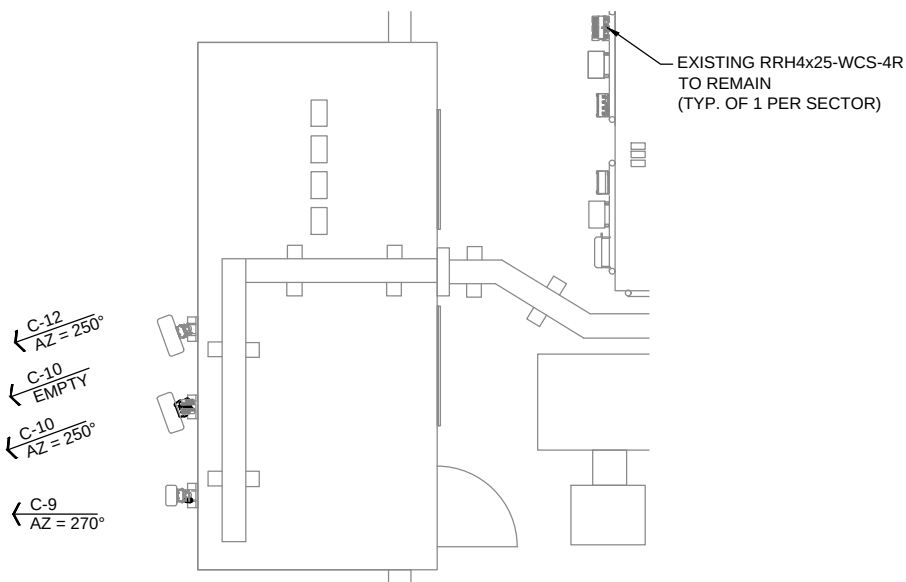


ELEVATION 115'

ELEVATION 129'

NOTES:

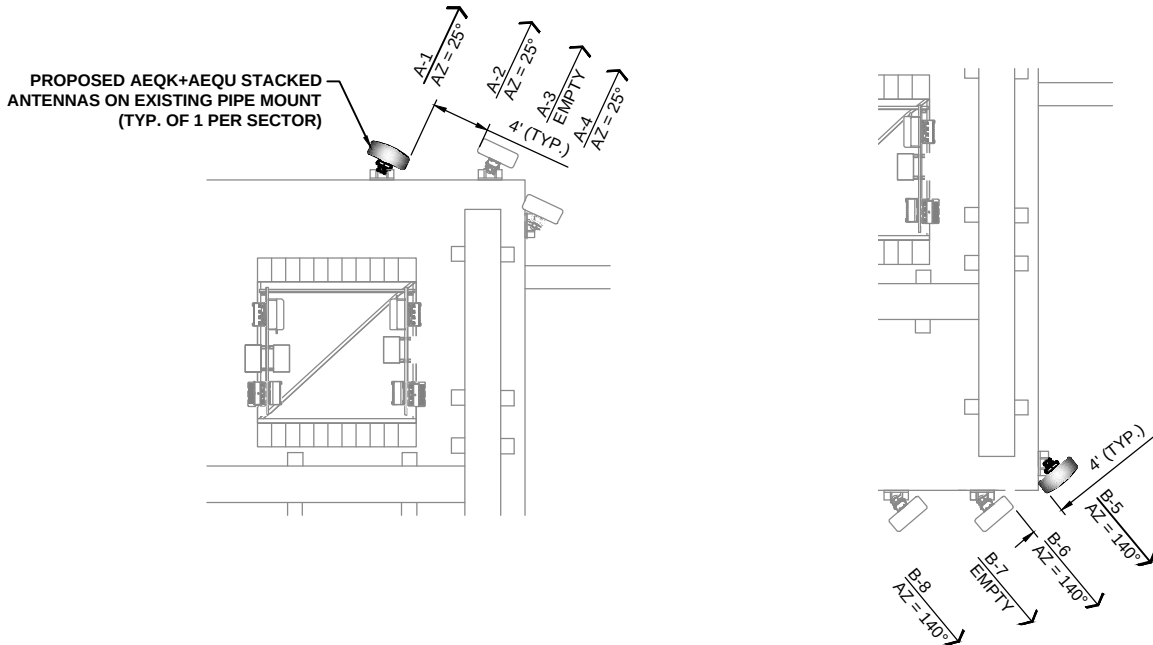
- CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER W/ ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
- CONTRACTOR SHALL NOT EXCEED MOUNTING MORE THAN (2) RRHS PER ANTENNA MOUNTING PIPE - RELOCATE TO AN ADJACENT ANTENNA MOUNTING PIPE AS NEEDED.
- CONTRACTOR SHALL REFER TO THE TOWER EQUIPMENT INSTALLATION MOUNT STRUCTURAL ANALYSIS REPORT; SITE NUMBER: N/A; SITE NAME: TULIP AVE; FA LOCATION: 10072888 ; ISSUED BY JACOBS TELECOMMUNICATIONS, INC. ON XX/XX/XX. PER THIS ANALYSIS NO MODIFICATIONS ARE REQUIRED FOR THE PROPOSED EQUIPMENT. CONTRACTOR SHALL CONFIRM ALL MOUNT MEMBERS AND PROPOSED APPURTENANCES ARE INSTALLED IN ACCORDANCE WITH THIS REPORT.



ELEVATION 107'

1 EXISTING ANTENNA LAYOUT

SCALE: 1/4" = 1'-0"

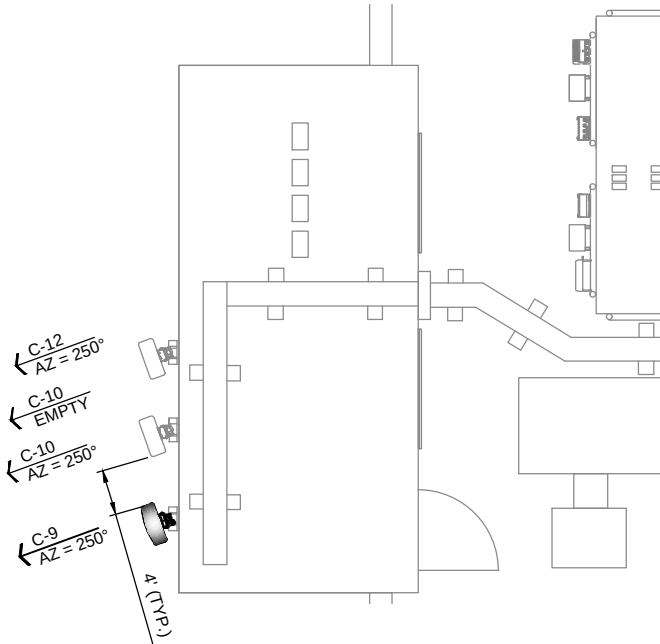


ELEVATION 115'

ELEVATION 128'

TOWER SCOPE OF WORK:

- DECOM (4)(E) 1-5/8" COAX AND LEAVE IN-PLACE
- DECOM (2)(E) 7/8" COAX AND LEAVE IN-PLACE
- REMOVE (E) KATHREIN 742 264 ANTENNA IN POS 1 (ALL SECTORS)
- REMOVE (E) TMAS/DIPLEXERS IN POS 1 (ALL SECTORS)
- INSTALL (N) AEQK IN POS 1 (1 PER SECTOR)
- INSTALL (N) AEQU STACKED ON TOP OF AEQK IN POS 1 (1 PER SECTOR)
- USE (E) SPARE 6 AWG DC TRUNKS FOR (N) AEQK AND (N) AEQU



ELEVATION 107'

2 PROPOSED ANTENNA LAYOUT

SCALE: 1/4" = 1'-0"



APPROVALS

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CONSTRUCTION _____

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TAKOMA PARK, MD 20912

EXISTING & PROPOSED
ANTENNA LAYOUT

MANUFACTURER:

NOKIA

MODEL NO.:

AEQK AIRSCALE MAA 64T64R 192AE n77 200w

TECHNOLOGY:

5G CBAND

DIMENSIONS (HxWxD):

29.53" x 17.72" x 9.53"

WEIGHT (lbs):

<99.21

POWER SUPPLY:

DC -40.5V TO -57V

TEMP. W/O SOLAR LOAD:

-40°C TO 55°C

17.72"

29.53"

9.53"

MANUFACTURER:

NOKIA

MODEL NO.:

AEQU AIRSCALE MAA 64T64R 192AE n77 200w

TECHNOLOGY:

5G DOD

DIMENSIONS (HxWxD):

29.53" x 17.72" x 9.45"

WEIGHT (lbs):

<99.21

POWER SUPPLY:

DC -40.5V TO -57V

TEMP. W/O SOLAR LOAD:

-40°C TO 55°C

17.72"

29.53"

9.45"

NOTE:

INCLUDED PRODUCTS WITH ANTENNA PURCHASE

ANTENNA MOUNTING PIPE

NOKIA AEQU ANTENNA

12"

NOKIA AEQK ANTENNA

1

AEQK AIRSCALE MAA 64T64R 192AE n77 200w

SCALE: NTS

2

AEQU AIRSCALE MAA 64T64R 192AE n77 200w

SCALE: NTS

3

CBAND MOUNTING DETAIL

SCALE: NTS

EQUIPMENT BAY

EQUIPMENT RAIL

FRONT DOOR

DEMARC BOX OPTION

BATTERY PEDESTAL OPTION

20"

24"

4

FLEX21-V2 CABINET

SCALE: NTS

5

DETAIL NOT USED

SCALE: NTS

6

DETAIL NOT USED

SCALE: NTS

7

DETAIL NOT USED

SCALE: NTS

8

DETAIL NOT USED

SCALE: NTS

9

DETAIL NOT USED

SCALE: NTS



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STATE OF MARYLAND

JENSEN JIANG

PROFESSIONAL ENGINEER

55911

23/22

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APPROVALS

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R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO:

EP4TURWL

DRAWN BY:

CRO

CHECKED BY:

LW

SUBMITTALS

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FA# 10072888
USID# 3939
TULIP AVE
7051 CARROL STREET
TAKOMA PARK, MD 20912

SITE DETAILS

C-4



Signage and barriers are the primary means of mitigating access to accessible areas of exposure. Below is a summary of existing and recommended signage at this AT&T facility.

Existing Signage and Barriers (AT&T Sectors)										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	1	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	3	0	0	0	0	0
Gamma	0	0	0	0	2	0	0	0	0	0

Recommended Signage and Barriers (AT&T Sectors) – Actions that MUST be Taken						
Location	Notice 2	Caution 2	Caution 2B	Caution 2C	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0
Alpha	0	0	0	0	0	0
Beta	0	12	0	0	0	X
Gamma	0	0	0	0	0	0

Final Compliant Configuration (AT&T Sectors) – All Mitigation Items that MUST be in Place										
Location	Information	Notice	Notice 2	Caution	Caution 2	Caution 2B	Caution 2C	Warning	Warning 2	Barriers
PH Ladder	0	0	0	0	0	0	0	0	0	0
Alpha	0	0	0	0	3	0	0	0	0	0
Beta	0	0	0	0	15	0	0	0	0	X
Gamma	0	0	0	0	2	0	0	0	0	0

Beta:

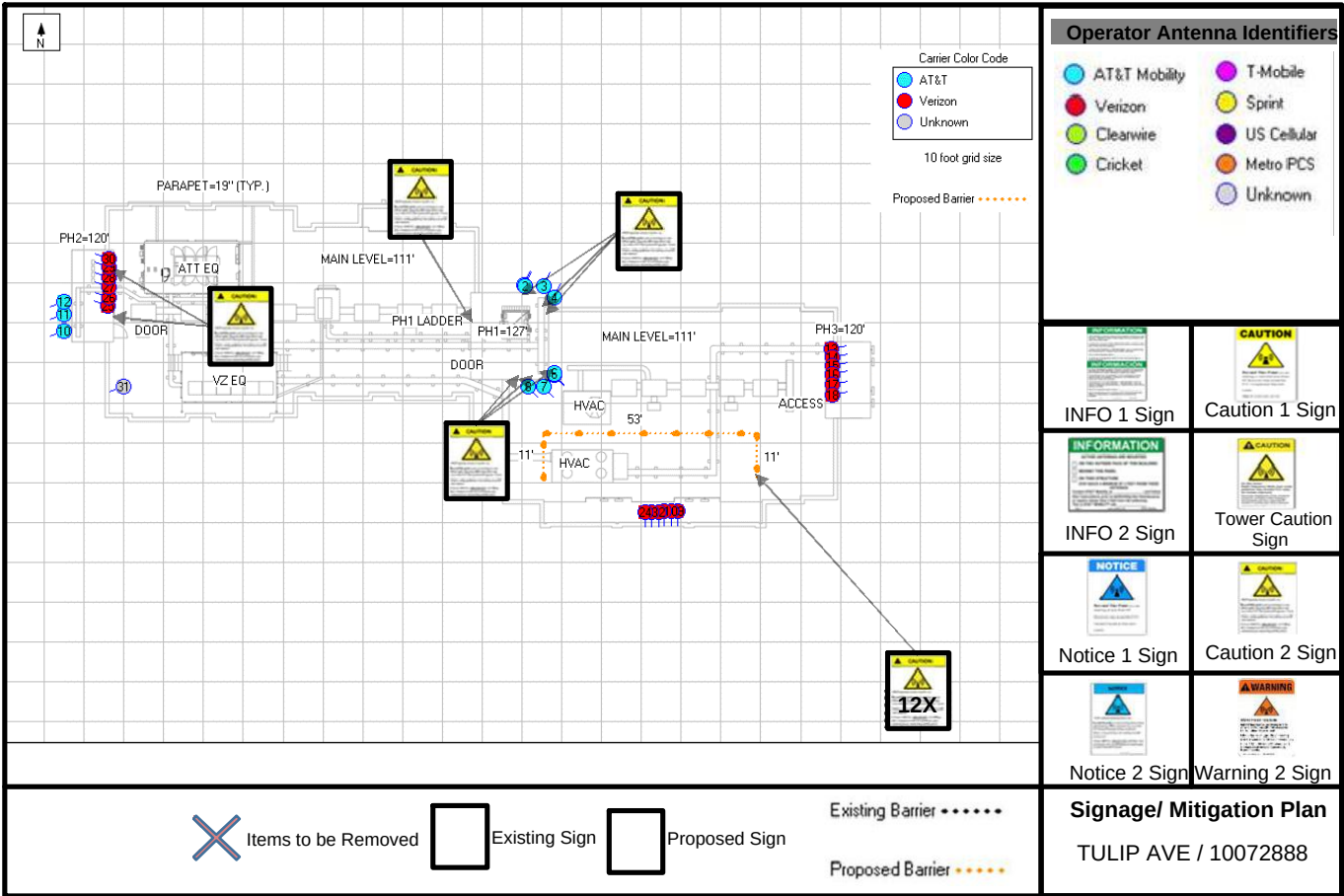
Install a 75' barrier (11'x53'x11' segments) with an estimated (12) stanchions. Install (12) Caution 2 signs on the barrier.

Notes:

Ensure all barriers are at least 6' away from any unprotected roof edges.
The existing Caution 2 sign on PH1 ladder is not required and can be removed.
The existing Caution 2 signs on Gamma sector are not required. However, they are not recommended to be removed to account for future carrier adds.



2.0 SITE SCALE MAP



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APPROVALS

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ZONING _____
CONSTRUCTION _____
A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS

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1	06/13/22	REVISION
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FA# 10072888

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TULIP AVE

7051 CARROL STREET
TAKOMA PARK, MD 20912

RF SIGNAGE AND MITIGATION

C-5

Model	NetSolve 721/7100 - 502127000 w26-position Panels	
Number of Radio Types	2	Fixed Generator Onsite
Radio Type #1:	Converters per trunk feed: 0	
Select Installation type	Unstacked	Stacked
Trunk Cable Length - one-way		560 ft
Trunk Cable Size (AWG - 4, 6, 8)		6
Jumper Cable Length - one-way		15 ft
Jumper Cable Size (AWG - 8, 10, or 12)		8
Total Quantity of RRU Trunk Feeds		3
Radio	None	AirScale AEQK B77
RRU Trunk Feed Peak DC Input Power (W)		931

Fill in the yellow highlighted cells as appropriate. See definitions for each cell on the Notes tab.

TOTAL # OF POWER EXTEND CONVERTERS= 0 = CB, Fuse, or End of Panel = Do Not Use

RRU Trunk Feed Busy Hour Input Power (W)	605
Minimum Source Voltage (V)	52
Converter Output Voltage (V)	58
Minimum RRU Operating Voltage (VDC)	40
Peak Power Rating of Power Extend Conv (W)	1000
Total Cable loop length	1150 ft
Cable Resistance (Ohms)	0.5129

RRU Voltage (VDC) at Min Source Voltage and Peak Power	40.09	48.07
RRU Trunk Feed Current (A) at Min Source Voltage and Peak Power	23.22	19.37
Source Power (W) per RRU Trunk Feed at Min Source V and Peak RRU Power	1207.6	1123.4
Total Source Power (W) at Min Source Voltage and Peak RRU Power	3622.9	3370.3
Peak Power System Current (A) Required for RRUs	69.7	66.1
Qty of Power Extend Converters Req'd per RRU Trunk Feed	N/A	0
Qty of Power Extend Converters Req'd per Site	N/A	0
# of Total Bullet Positions Required	N/A	0

RRU Voltage (VDC) at Min Source Voltage and Busy Hour	45.12	52.04
RRU Trunk Feed Current (A) at Min Source Voltage and Busy Hour	13.41	11.63
Source Power (W) at Min Source V and Busy Hour per RRU Trunk Feed	697.4	674.5
Total Source Power (W) at Min Source Voltage and Busy Hour	2092.2	2023.6

Power Extend Converter Average Power Level Above which a Space is required Between Each 4 Units (W)	250
Power Extend Converter Average Power Level Above which a Space is required Between Each 3 Units (W)	475
Power Extend Converter Average Power Level Above which a Space is required Between Each 2 Units (W)	525
Power Extend Converter Average Power Level Above which a Space is required Between Each Unit (W)	650

RRU Trunk Feed Busy Hour Input Power (W)	605
Minimum Source Voltage (V)	52
Converter Output Voltage (V)	58
Minimum RRU Operating Voltage (VDC)	40
Peak Power Rating of Power Extend Conv (W)	1000
Total Cable loop length	1150 ft
Cable Resistance (Ohms)	0.5129

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Total Source Power (W) at Min Source Voltage and Busy Hour	2092.2	2023.6

Power Extend Converter Average Power Level Above which a Space is required Between Each 4 Units (W)	250
Power Extend Converter Average Power Level Above which a Space is required Between Each 3 Units (W)	475
Power Extend Converter Average Power Level Above which a Space is required Between Each 2 Units (W)	525
Power Extend Converter Average Power Level Above which a Space is required Between Each Unit (W)	650



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STATE OF MARYLAND
JOHN W. JOHNSON, JR.
PROFESSIONAL ENGINEER
55911

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CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS		
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FA# 10072888
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DC TRUNK CABLE CALCULATOR

E-2

AT&T CABLING:

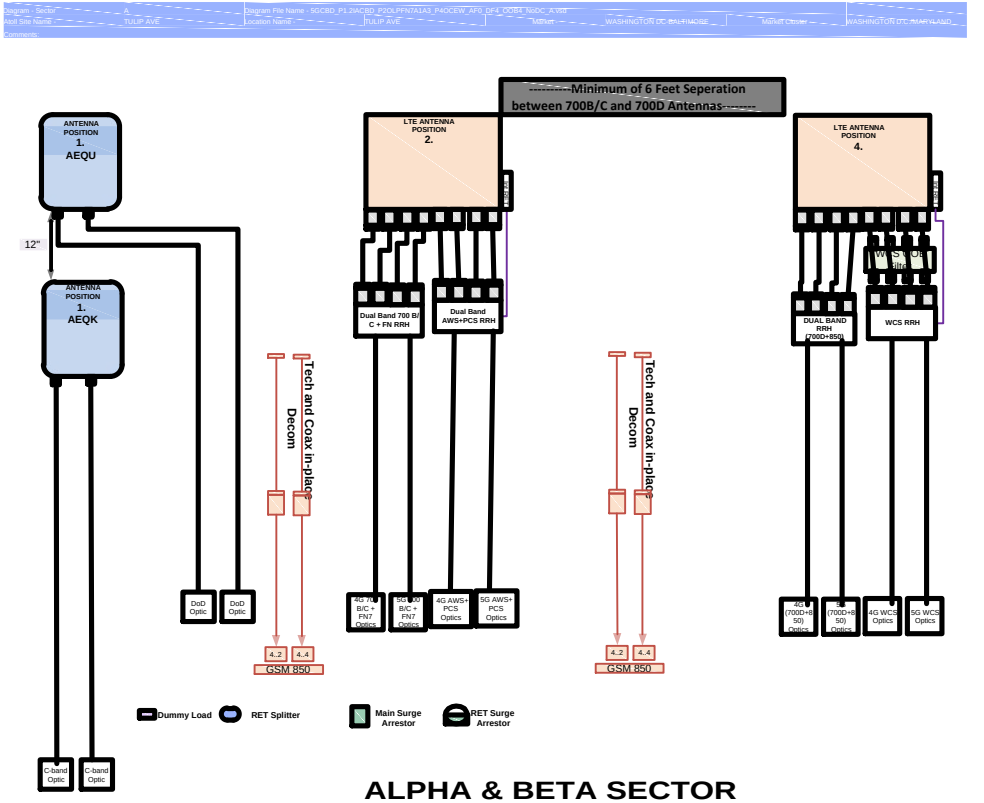
(9) ANTENNAS
(12) RRHS
(2) WCS FILTERS
(3) DC9 BOXES
(8) 1-5/8" COAX
(4) 7/8" COAX
(9) 0.96" DC TRUNKS (6 AWG)
(3) 0.4" FIBER TRUNKS (24 PAIR)

RFDS ID: 4445171

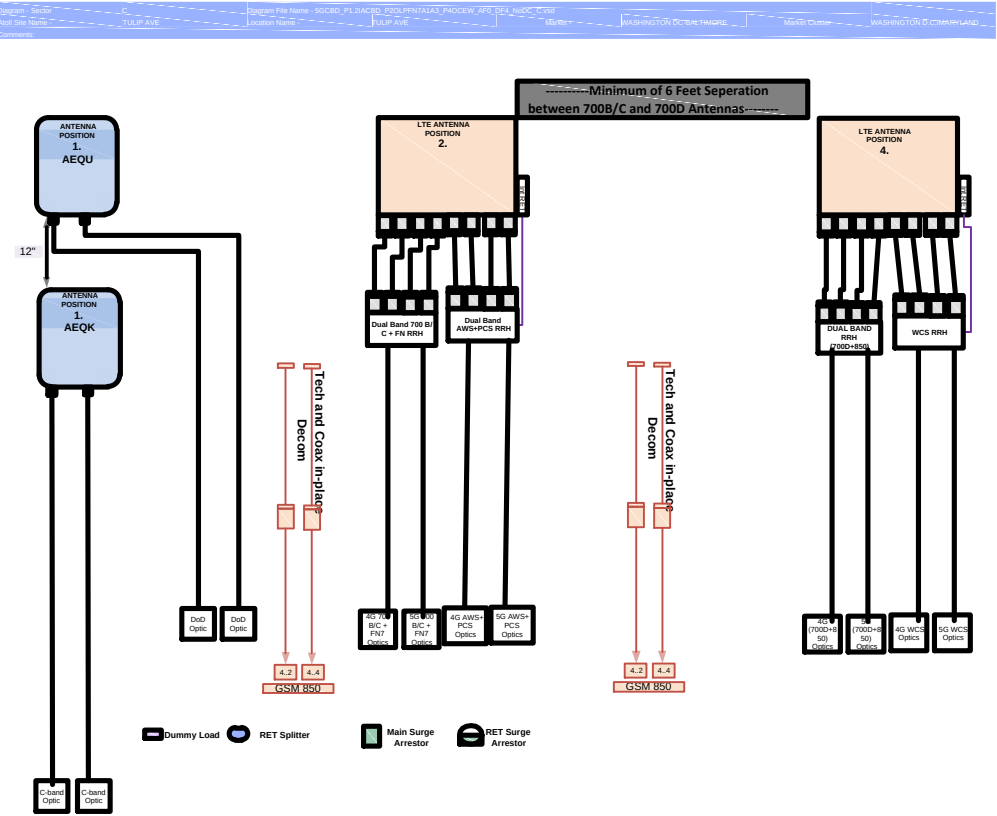
ANTENNA POSITION	ANTENNA MODEL	ANTENNA MAKE	AZIMUTH	RAD CENTER FT. AGL.	TMAS, RRHS & DIPLEXERS	COAXIAL FEEDER	
					MODEL	SIZE	LENGTH
#1	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	25°	115'	-	SHARED FIBER	60'
#2	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	25°	115'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	60'
#3	-	-	-	-	-	-	-
#4	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	25°	115'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	60'
#5	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	140°	129'	-	SHARED FIBER	130'
#6	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	140°	129'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	130'
#7	-	-	-	-	-	-	-
#8	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	140°	129'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	130'
#9	AEQK+AEQU STACKED (71.0"x17.7"x9.5") (198.4 LBS)	NOKIA	250°	107'	-	SHARED FIBER	130'
#10	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	250°	107'	(1) RRH 4T4R B12/14 320W AHLBA (1) RRH 4T4R B25/66 320W AHFIB	SHARED FIBER	130'
#11	-	-	-	-	-	-	-
#12	NNHH-65A-R4 (55.1"x19.6"x7.8") (68.3 LBS)	COMMSCOPE	250°	107'	(1) RRH 4T4R B5/29 240W AHBCB (1) RRH4x25-WCS-4R	SHARED FIBER	130'

NOTES:

1. VERIFY ANTENNA DIMENSIONS WITH MANUFACTURER.
2. ALL NEW ANTENNAS SHALL RECEIVE ANTENNA MOUNTING KIT FOR 2 TO 4.5 O.D. MAST (QTY. 2)
3. ALL NEW ANTENNAS SHALL RECEIVE A LOCKING TILT MOUNT KIT 0-13 DEGREES DOWNTILT ANGLE
4. VERIFY FINAL ANTENNA MODEL WITH CURRENT VERSION OF THE AT&T RFDS.



ALPHA & BETA SECTOR



GAMMA SECTOR

NOTES:

1. CONTRACTOR TO VERIFY FINAL RF CONFIGURATION AND NOTIFY CARRIER AND ENGINEER WITH ANY DISCREPANCIES PRIOR TO THE INSTALLATION.
2. PLUMBING DIAGRAM SHOWN IS BASED ON APPROVED FINAL RFDS ID: 4445171 DATED ON 02/25/22.



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APPROVALS

LANDLORD _____

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R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS

2	08/23/22	ISSUED
1	06/13/22	REVISION
0	06/01/22	ISSUED
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FA# 10072888

USID# 3939

TULIP AVE

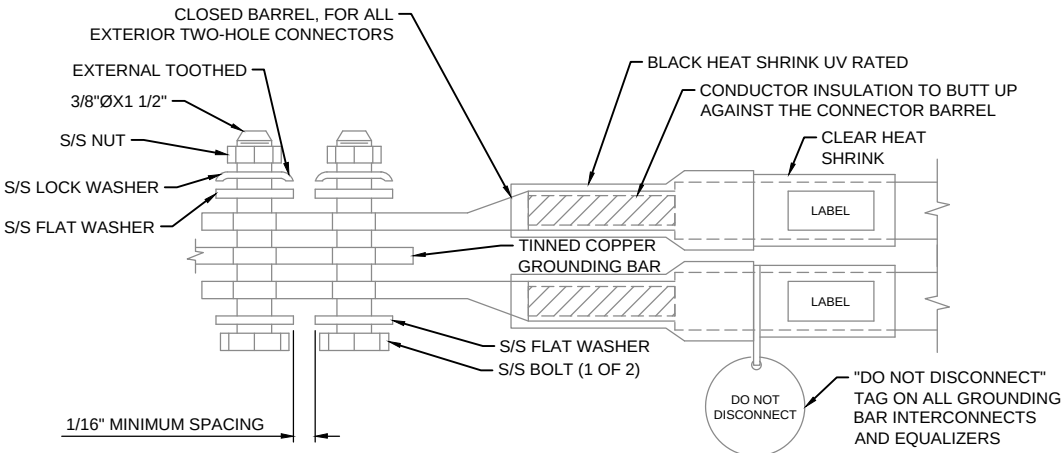
7051 CARROL STREET
TAKOMA PARK, MD 20912

ANTENNA CHART & PLUMBING
DIAGRAM

RF-1

NOTES:

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUNDING BAR. ROUTE CONDUCTORS TO BURIED GROUNDING RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL GROUNDING BARS SHALL BE STAMPED IN TO THE METAL "IF STOLEN DO NOT RECYCLE." THE CONTRACTOR SHALL USE PERMANENT MARKER TO DRAW THE LINES BETWEEN EACH SECTION AND LABEL EACH SECTION ("P", "A", "N", "I") WITH 1" HIGH LETTERS.
3. ALL HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. FOR GROUND BOND TO STEEL ONLY: INSERT A CADMIUM FLAT WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
5. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUNDING CONDUCTOR DOWN TO GROUNDING BUS.
6. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUNDING BAR AND BOLTED ON THE BACK SIDE. INSTALL BLACK HEAT-SHRINKING TUBE, 600 VOLT INSULATION, ON ALL GROUNDING TERMINATIONS. THE INTENT IS TO WEATHERPROOF THE COMPRESSION CONNECTION.
7. SUPPLIED AND INSTALLED BY CONTRACTOR.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUNDING BAR AS REQUIRED, PROVIDING 50% SPARE CONNECTION POINTS.
9. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).

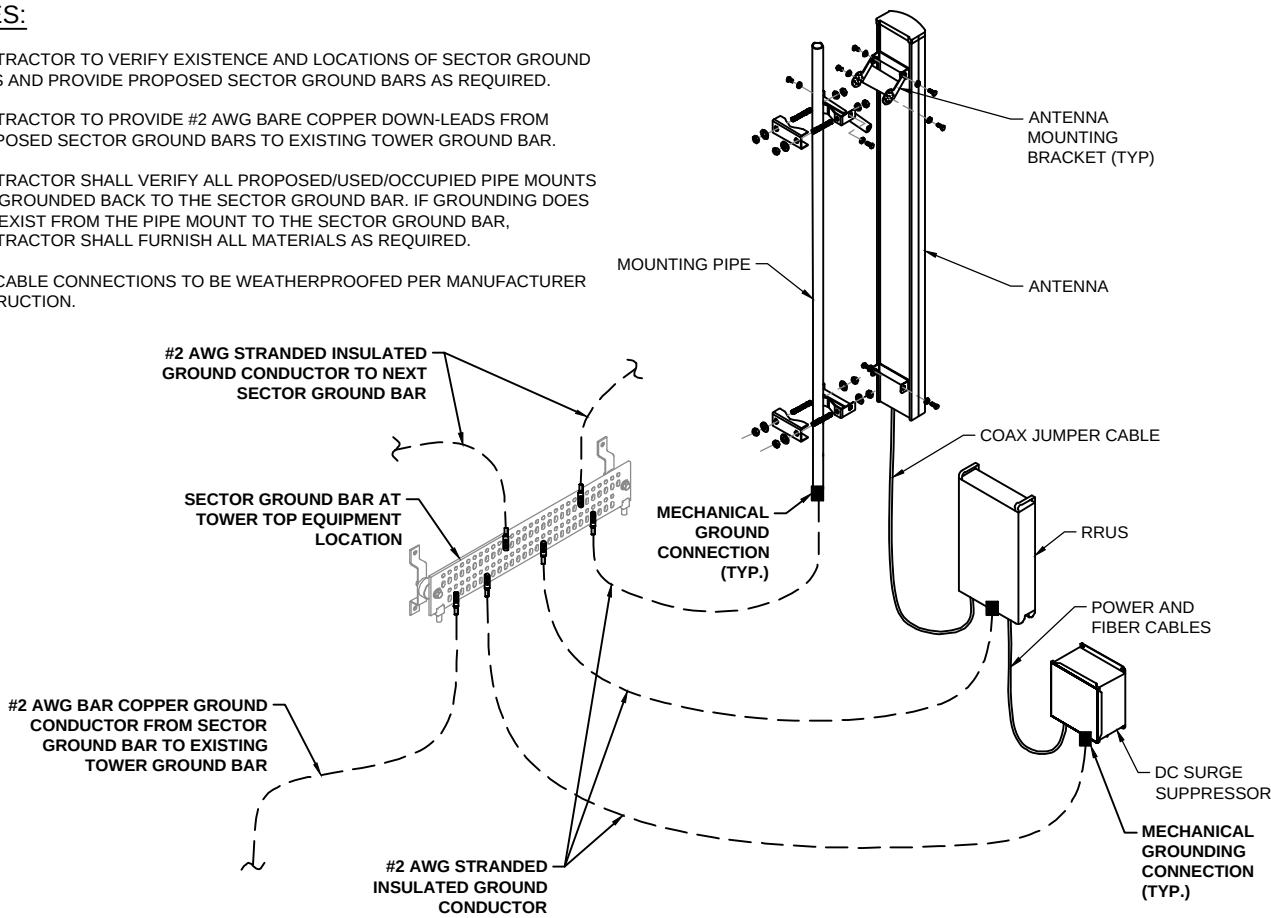


1 EXTERIOR TWO HOLE LUG DETAIL

SCALE: N.T.S.

NOTES:

1. CONTRACTOR TO VERIFY EXISTENCE AND LOCATIONS OF SECTOR GROUND BARS AND PROVIDE PROPOSED SECTOR GROUND BARS AS REQUIRED.
2. CONTRACTOR TO PROVIDE #2 AWG BARE COPPER DOWN-LEADS FROM PROPOSED SECTOR GROUND BARS TO EXISTING TOWER GROUND BAR.
3. CONTRACTOR SHALL VERIFY ALL PROPOSED/USED/OCCUPIED PIPE MOUNTS ARE GROUNDED BACK TO THE SECTOR GROUND BAR. IF GROUNDING DOES NOT EXIST FROM THE PIPE MOUNT TO THE SECTOR GROUND BAR, CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.
4. ALL CABLE CONNECTIONS TO BE WEATHERPROOFED PER MANUFACTURER INSTRUCTION.



4 TYPICAL ANTENNA GROUNDING SCHEMATIC

SCALE: N.T.S.

GENERAL NOTES:

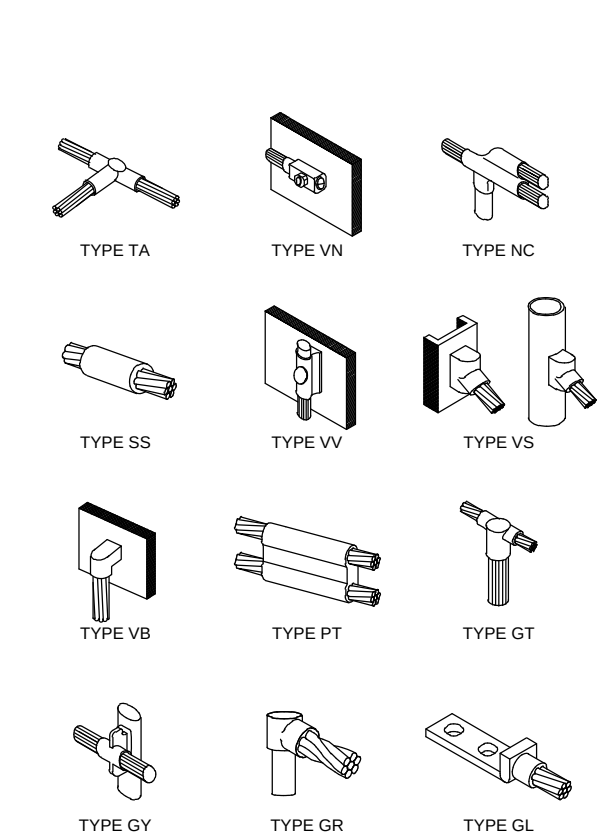
1. CONTRACTOR SHALL HAVE A COMPLETE UNDERSTANDING OF THE CONTENTS OF AT&T STANDARD TP-76416.
2. ALL INSTALLATIONS SHALL BE FIELD VERIFIED.
3. ALL GROUND CONNECTIONS FOR ALL RELOCATED EQUIPMENT SHALL BE RE-ESTABLISHED BY THE CONTRACTOR. CONTRACTOR SHALL FURNISH ALL MATERIALS AS REQUIRED.

GROUNDING NOTES:

1. TOWER GROUNDING BAR: EXTEND (2) #2 AWG TINNED CU WIRE FROM BURIED GROUND RING UP TO THE TOWER GROUND BAR AND MAKE A MECHANICAL CONNECTION. SECURE GROUND BAR DIRECTLY TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
2. ANTENNA GROUNDING BAR: ANDREW CORPORATION PART #UGBKIT-0424-T MOUNT GROUND BAR DIRECTLY TO TOWER. SECURE TO TOWER WITH STAINLESS STEEL MOUNTING MATERIAL.
3. GROUNDING BAR: LOCATED CLOSE TO GRADE LOCK BOX TESSCO PART #351546: INSTALL PER MANUFACTURER GUIDELINES.
4. EXOTHERMIC OR COMPRESSION CONNECTION FOR PIPE MOUNT TO ANTENNA ROUTE CONDUCTOR TO NEAREST GROUNDING BAR SO THE GROUNDING CONDUCTORS PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. USE #2 AWG SOLID TINNED COPPER CONDUCTOR. GROUNDING CONNECTION SHALL BE LOCATED AT THE TOP 2" OF PIPE.
5. ALL GROUNDING CONDUCTORS SHALL BE #2 AWG COPPER TINNED UNLESS NOTED OTHERWISE.
6. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND WITH GRADUAL BEND AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
7. KOPR-SHIELD ANTI-OXIDATION COMPOUND SHALL BE USED ON ALL COMPRESSION GROUNDING CONNECTIONS.
8. ALL EXOTHERMIC CONNECTIONS SHALL BE INSTALLED UTILIZING THE PROPER CONNECTION/MOLD AND MATERIALS FOR THE PARTICULAR APPLICATION.
9. ALL BOLTED GROUNDING CONNECTIONS SHALL BE INSTALLED WITH AN EXTERNAL TOOTHED LOCK WASHER. GROUNDING BUS BARS MAY HAVE PRE-PUNCHED HOLES OR TAPPED HOLES. ALL HARDWARE SHALL BE SECURITY TORQUE HARDWARE 3/8" STAINLESS STEEL.
10. EXTERNAL GROUNDING CONDUCTOR SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS, CONDUITS, OR SUPPORTS TO PRECLUDE ESTABLISHING A MAGNETIC CHOKE POINT.
11. PLASTIC CLIPS SHALL BE USED TO FASTEN AND SUPPORT GROUNDING CONDUCTORS. FERROUS METAL CLIPS WHICH COMPLETELY SURROUND THE GROUNDING CONDUCTOR SHALL NOT BE USED.
12. IF COAX ON ICE BRIDGE IS MORE THAT 6' FROM THE GROUND BAR AT THE BASE OF THE TOWER, A SECOND GROUND BAR WILL BE NEEDED AT THE END OF THE ICE BRIDGE RUN TO GROUND THE COAX GROUND KIT AND THE IN-LINE SURGE ARRESTORS (SURGE ARRESTORS INSTALLED BY LUCENT ONLY HAVE 6' GROUND TAILS).
13. CONTRACTOR SHALL REPAIR/PLACE EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.
14. DO NOT ALLOW THE COPPER CONDUCTOR TO TOUCH THE GALVANIZED GUY WIRE AT THE CONNECTION POINT OR AT ANY OTHER POINT. NO EXOTHERMICALLY WELDED CONNECTION SHALL BE MADE TO THE GUY WIRE.
15. CONTRACTOR SHALL VERIFY EXISTING SECTOR GROUNDING CONDITION AND GROUND THE PROPOSED EQUIPMENT IN THE SAME MANNER. A PROPOSED SECTOR GROUND BAR SHALL BE INSTALLED IF REQUIRED.

2 GROUNDING BAR DETAIL

SCALE: N.T.S.



3 GROUNDING DETAILS

SCALE: N.T.S.



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FA# 10072888

USID# 3939

TULIP AVE

7061 CARROL STREET
TAKOMA PARK, MD 20912

GROUNDING DETAILS

G-1

4

5

DETAIL NOT USED

SCALE: N.T.S.

AT&T COAX AND JUMPER COLOR CODE CHART FOR WV-VA SITES

Color Code for Hard-Line Coax to Antennas					Color Code for Jumpers from Antenna to TMAs/Diplexers or RRH - or - from Antenna to Hard-Line Coax														
Sector	Coax Lin	A1	A2	A3	A4	Sector	Technology	Frequency	TX/RX	1st Band	2nd Band	3rd Band	4th Band	5th Band	6th Band	7th Band	8th Band	9th Band	Notes
Alpha	1st Line	1 Green	2 Green	3 Green	4 Green	A1-1	LTE	700 D/E	TXM/RXM	Green	Gray	Orange							
Alpha	2nd Line	1 Green	2 Green	3 Green	4 Green	A1-2	LTE	700 D/E	TXD1/RXD1	Green	Gray	Orange	Brown						
		1 Brown	1 Brown	1 Brown	1 Brown	A1-3	LTE	WCS	TXM/RXM	Green	Gray	Red							
*Note: Pipe 1 is to the left if you are standing behind the antennas in this sector.						A1-4	LTE	WCS	TXD1/RXD1	Green	Gray	Red	Brown						
						A1-5	LTE	WCS	TXD2/RXD2	Green	Gray	Red	Brown	Brown					
						A1-6	LTE	WCS	TXD3/RXD3	Green	Gray	Red	Brown	Brown	Brown				
						A2-1	UMTS/GSM	850	TXM/RXM	Green	Green	Yellow	Orange						
						A2-2	UMTS/GSM	850	TXD1/RXD1	Green	Green	Yellow	Orange	Brown					
						A2-3	UMTS/GSM	1900	TXM/RXM	Green	Green	Yellow	Violet						
						A2-4	UMTS/GSM	1900	TXD1/RXD1	Green	Green	Yellow	Violet	Brown					
						A2-5	UMTS/LTE	1900	TXD2/RXD2	Green	Green	Yellow	Violet	Brown	Brown				
						A2-6	UMTS/LTE	1900	TXD3/RXD3	Green	Green	Yellow	Violet	Brown	Brown	Brown			
						A3-1	UMTS	850	TXM/RXM	Green	Green	Green	Yellow	Orange					
						A3-2	UMTS	850	TXD1/RXD1	Green	Green	Green	Yellow	Orange	Brown				
						A3-3	UMTS/LTE	1900	TXM/RXM	Green	Green	Green	Yellow	Violet					
						A3-4	UMTS/LTE	1900	TXD1/RXD1	Green	Green	Green	Yellow	Violet	Brown				
						A3-5	UMTS/LTE	1900	TXD2/RXD2	Green	Green	Green	Yellow	Violet	Brown	Brown			
						A3-6	UMTS/LTE	1900	TXD3/RXD3	Green	Green	Green	Yellow	Violet	Brown	Brown	Brown		
						A4-1	LTE	700	TXM/RXM	Green	Green	Green	Green	Gray	Orange				
						A4-2	LTE	700	TXD1/RXD1	Green	Green	Green	Green	Gray	Orange	Brown			
						A4-3	LTE	2100	TXM/RXM	Green	Green	Green	Green	Gray	Violet				
					A4-4	LTE	2100	TXD1/RXD1	Green	Green	Green	Green	Gray	Violet	Brown				
					A4-5	LTE	2100	TXD2/RXD2	Green	Green	Green	Green	Gray	Violet	Brown	Brown			
					A4-6	LTE	2100	TXD3/RXD3	Green	Green	Green	Green	Gray	Violet	Brown	Brown	Brown		
Sector	Coax Lin	B1	B2	B3	B4	B1-1	LTE	700 D/E	TXM/RXM	Blue	Gray	Orange							
Beta	1st Line	1 Blue	2 Blue	3 Blue	4 Blue	B1-2	LTE	700 D/E	TXD1/RXD1	Blue	Gray	Orange	Brown						
Beta	2nd Line	1 Blue	2 Blue	3 Blue	4 Blue	B1-3	LTE	WCS	TXM/RXM	Blue	Gray	Red							
		1 Brown	1 Brown	1 Brown	1 Brown	B1-4	LTE	WCS	TXD1/RXD1	Blue	Gray	Red	Brown						
*Note: Pipe 1 is to the left if you are standing behind the antennas in this sector.						B1-5	LTE	WCS	TXD2/RXD2	Blue	Gray	Red	Brown	Brown					
						B1-6	LTE	WCS	TXD3/RXD3	Blue	Gray	Red	Brown	Brown	Brown				
						B2-1	UMTS/GSM	850	TXM/RXM	Blue	Blue	Yellow	Orange						
						B2-2	UMTS/GSM	850	TXD1/RXD1	Blue	Blue	Yellow	Orange	Brown					
						B2-3	UMTS/GSM	1900	TXM/RXM	Blue	Blue	Yellow	Violet						
						B2-4	UMTS/GSM	1900	TXD1/RXD1	Blue	Blue	Yellow	Violet	Brown					
						B2-5	UMTS/LTE	1900	TXD2/RXD2	Blue	Blue	Yellow	Violet	Brown	Brown				
						B2-6	UMTS/LTE	1900	TXD3/RXD3	Blue	Blue	Yellow	Violet	Brown	Brown	Brown			
						B3-1	UMTS	850	TXM/RXM	Blue	Blue	Blue	Yellow	Orange					
						B3-2	UMTS	850	TXD1/RXD1	Blue	Blue	Blue	Yellow	Orange	Brown				
						B3-3	UMTS/LTE	1900	TXM/RXM	Blue	Blue	Blue	Yellow	Violet					
						B3-4	UMTS/LTE	1900	TXD1/RXD1	Blue	Blue	Blue	Yellow	Violet	Brown				
						B3-5	UMTS/LTE	1900	TXD2/RXD2	Blue	Blue	Blue	Yellow	Violet	Brown	Brown			
						B3-6	UMTS/LTE	1900	TXD3/RXD3	Blue	Blue	Blue	Yellow	Violet	Brown	Brown	Brown		
						B4-1	LTE	700	TXM/RXM	Blue	Blue	Blue	Blue	Gray	Orange				
						B4-2	LTE	700	TXD1/RXD1	Blue	Blue	Blue	Blue	Gray	Orange	Brown			
						B4-3	LTE	2100	TXM/RXM	Blue	Blue	Blue	Blue	Gray	Violet				
						B4-4	LTE	2100	TXD1/RXD1	Blue	Blue	Blue	Blue	Gray	Violet	Brown			
					B4-5	LTE	2100	TXD2/RXD2	Blue	Blue	Blue	Blue	Gray	Violet	Brown	Brown			
					B4-6	LTE	2100	TXD3/RXD3	Blue	Blue	Blue	Blue	Gray	Violet	Brown	Brown	Brown		
Sector	Coax Lin	G1	G2	G3	G4	G1-1	LTE	700 D/E	TXM/RXM	White	Gray	Orange							
Gamma	1st Line	1 White	2 White	3 White	4 White	G1-2	LTE	700 D/E	TXD1/RXD1	White	Gray	Orange	Brown						
Gamma	2nd Line	1 White	2 White	3 White	4 White	G1-3	LTE	WCS	TXM/RXM	White	Gray	Red							
		1 Brown	1 Brown	1 Brown	1 Brown	G1-4	LTE	WCS	TXD1/RXD1	White	Gray	Red	Brown						
*Note: Pipe 1 is to the left if you are standing behind the antennas in this sector.						G1-5	LTE	WCS	TXD2/RXD2	White	Gray	Red	Brown	Brown					
						G1-6	LTE	WCS	TXD3/RXD3	White	Gray	Red	Brown	Brown	Brown				
						G2-1	UMTS/GSM	850	TXM/RXM	White	White	Yellow	Orange						
						G2-2	UMTS/GSM	850	TXD1/RXD1	White	White	Yellow	Orange	Brown					
						G2-3	UMTS/GSM	1900	TXM/RXM	White	White	Yellow	Violet						
						G2-4	UMTS/GSM	1900	TXD1/RXD1	White	White	Yellow	Violet	Brown					
						G2-5	UMTS/LTE	1900	TXD2/RXD2	White	White	Yellow	Violet	Brown	Brown				
						G2-6	UMTS/LTE	1900	TXD3/RXD3	White	White	Yellow	Violet	Brown	Brown	Brown			
						G3-1	UMTS	850	TXM/RXM	White	White	White	Yellow	Orange					
						G3-2	UMTS	850	TXD1/RXD1	White	White	White	Yellow	Orange	Brown				
						G3-3	UMTS/LTE	1900	TXM/RXM	White	White	White	Yellow	Violet					
						G3-4	UMTS/LTE	1900	TXD1/RXD1	White	White	White	Yellow	Violet	Brown				
						G3-5	UMTS/LTE	1900	TXD2/RXD2	White	White	White	Yellow	Violet	Brown	Brown			
						G3-6	UMTS/LTE	1900	TXD3/RXD3	White	White	White	Yellow	Violet	Brown	Brown	Brown		
						G4-1	LTE	700	TXM/RXM	White	White	White	White	Gray	Orange				
						G4-2	LTE	700	TXD1/RXD1	White	White	White	White	Gray	Orange	Brown			
						G4-3	LTE	2100	TXM/RXM	White	White	White	White	Gray	Violet				
						G4-4	LTE	2100	TXD1/RXD1	White	White	White	White	Gray	Violet	Brown			
					G4-5	LTE	2100	TXD2/RXD2	White	White	White	White	Gray	Violet	Brown	Brown			
					G4-6	LTE	2100	TXD3/RXD3	White	White	White	White	Gray	Violet	Brown	Brown	Brown		

Base Color	
Sector A	Green
Sector B	Blue
Sector C	White

Technology Color	
LTE	Gray
UMTS	Yellow
GSM	Black

Frequency Color	
700/850	Orange
WCS	Red
1900/2100	Violet

Type Color	
Main (M)	White
Diversity (D)	Brown

Jumpers from TMA to Antenna/Diplexer to Equipment: ORANGE band to note Low-Side frequencies VIOLET band to note High-Side frequencies YELLOW band to note UMTS GRAY band to note LTE

FIBER RUN KIN COLOR CODE:	
1ST=	1 GRAY
2ND=	2 GRAY
DC POWER RUN KIN COLOR CODE:	
1ST=	1 WHITE / 1 BLUE
2ND=	2 WHITE / 1 BLUE
3RD=	3 WHITE / 1 BLUE
4TH=	4 WHITE / 1 BLUE



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APPROVALS

LANDLORD _____
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R.F. _____
ZONING _____
CONSTRUCTION _____
A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

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FA# 10072888
USID# 3939
TULIP AVE
7061 CARROL STREET
TAKOMA PARK, MD 20912

COLOR CODE CHART

S-1

Field	Length	Description	
USID	6	Six characters that defined the sites USID. USID's less than 6 characters in length are preceded with 0's (zeros) (example:003831)	
CellId1	1	Allowed Value	Description
		A	Alpha
		B	Beta
		C	Gamma
CellId2	1	D	Delta
		E	Epsilon
		F	Zeta
CellId3	1	-	No Transmitter connected to this port
AntPos	1	Allowed Value	Description
		1	Antenna Position 1 on this face
		2	Antenna Position 2 on this face
		i	Antenna Position x on this face
		i	Antenna Position x on this face
		9	Antenna Position 9 on this face
		-	Antenna Position unknown
FreqBand	1	Allowed Value	Description
		2	2100 MHz (AWS1) only
		3	2300 MHz (WCS) only
		6	Band 66 (AWS3) only
		7	700 MHz B & C Band only
		8	850 MHz only
		9	1900 MHz (PCS)
		A	2100 MHz (AWS1) & Band 66 (AWS3) combined
		B	1900 MHz (PCS) & Band 66 (AWS3) combined
		C	2100 MHz (AWS1) & Band 66 (AWS3) & 2300 MHz (WCS) combined
		D	1900 MHz (PCS) & 2100 MHz (AWS1) combined
		E	2300 MHz (WCS) & Band 66 (AWS3) combined
		F	1900 MHz (PCS) & 2300 MHz (WCS) combined
		G	1900 MHz (PCS) & 2100 MHz (AWS1) & Band 66 (AWS3) combined
		H	2100 MHz (AWS1) & 2300 MHz (WCS) combined
		I	1900 MHz (PCS) & 2300 MHz (WCS) & Band 66 (AWS3) combined
		J	1900 MHz (PCS) & 2100 MHz (AWS1) & 2300 MHz (WCS) combined
		K	700 MHz B & C Band & 850 MHz combined
		M	1900 MHz (PCS) & 2100 MHz (AWS1) & Band 66 (AWS3) & 2300 MHz (WCS) combined
		P	upper 700 MHz - Band 14 (FirstNet)
		Q	700 MHz D & E Band only
		R	700 MHz B & C & Band 14 (FirstNet) & 850 MHz combined
		S	700 MHz B & C & 700 MHz D & E & 850 MHz combined
		T	Tri-Band: Band 12 (700 MHz B&C), Band 14 (FirstNet), and Band 29 (700 MHz D&E)
		U	700 MHz B & C & 700 MHz D & E & Band 14 (FirstNet) & 850 MHz combined
		W	700 MHz D & E & Band 14 (FirstNet) combined
		X	700 MHz B & C & Band 14 (FirstNet) combined
		Y	700 MHz D & E & 850 MHz combined
		Z	Band 14 (FirstNet) & 850 MHz combined
		-	No Frequency Assigned "not-in-use"

Field	Length	Description
Tech	1	Allowed Value Technology / Technology Combination
		F License protection/FCC compliance/FWLL
		G Reserved
		J LTE-5G NR
		K UMTS-LTE-5G NR
		L LTE
		N None/Reserved
		U UMTS
		V UMTS-LTE
		Y UMTS-5G NR
		H Reserved
		M Exception
		P Reserved
		Q Reserved
		R 5G NR
		S Reserved
T Reserved		

Delimiter	13th character
-	Delimiter
B	Border Control
C	CGSA
W	WCS in combination with other bands
P	License Protection
O	Optimized
Delimiter	14th character
-	Delimiter
Z	Programming Code for RET validated

2.3.1 Dual Broadband Antennas - TYPE 1

Powerwave, Kathrein and older Andrew antennas will be recognized by a RET controller as TYPE1 Antenna Line Devices. These require 2 AISG connections. One connection will be from the AISG source (RRH, TMA, RET Controller or Homerun Cable) to the first RET motor and the second connection will be from RET motor 1 to RET motor 2.

Connections from the RET controller will be made to the male connector of the RET motor. Appropriate daisy chain connection will then have to be made to the next RET motor. Figure 5 below is a Powerwave antenna, but the Kathrein will be very similar in appearance and connection.

For all Type 1 dual broadband antennas, the daisy chain connection should be made and both RET motors should be configured in the QSS, even if the high band RET motor is not to be utilized until future AWS launches.

Dual Broadband Antennas - TYPE 17

Newer Andrew antennas and all KMW antennas will be recognized by RET controllers as TYPE17 Antenna Line Devices since there are multiple ALDs on one bus. These antennas only require one AISG connection since both RET motors are inside the antenna. Connections from the RET controller will be made to the male connector of the RET/AISG Antenna Port. Figure 7 below is an Andrew antenna, but the KMW antenna will be very similar in appearance and connection.

Below is the list of approved RET Type 17 antennas as per 6/29/2011. Andrew will continue to phase out older models which are Type 1 with newer models that will be Type 17.

Vendor	Frequency Band	H&W	Length	Model
Andrew	Dual Broadband	66"	6'	SBNH-106665B
Andrew	Dual Broadband	66"	8'	SBNH-106665C
Andrew	Dual Broadband	66"	6'	SBNH-106665B
Andrew	Dual Broadband	66"	8'	SBNH-106665C
KMW	Dual Broadband	66"	4'	AM-X-CD-14-65-00T-RET
KMW	Dual Broadband	66"	6'	AM-X-CD-16-65-00T-RET
KMW	Dual Broadband	66"	8'	AM-X-CD-17-65-00T-RET
KMW	Dual Broadband	66"	4'	NOT AVAILABLE YET
KMW	Dual Broadband	66"	6'	NOT AVAILABLE YET
KMW	Dual Broadband	66"	8'	AM-X-CD-16-85-00T-RET
KMW	Single Broadband	66"	4'	AM-X-CW-14-65-00T-RET
KMW	Single Broadband	66"	6'	AM-X-CW-16-65-00T-RET
KMW	Single Broadband	66"	8'	AM-X-CW-18-65-00T-RET
KMW	Single Broadband	66"	4'	AM-X-CW-13-85-00T-RET
KMW	Single Broadband	66"	6'	AM-X-CW-15-85-00T-RET
KMW	Single Broadband	66"	8'	AM-X-CW-16-85-00T-RET



Jacobs.
Challenging today.
Reinventing tomorrow.



APPROVALS

LANDLORD _____

LEASING _____

R.F. _____

ZONING _____

CONSTRUCTION _____

A & E _____

PROJECT NO: EP4TURWL

DRAWN BY: CRO

CHECKED BY: LW

SUBMITTALS			
2	08/23/22	ISSUED	
1	06/13/22	REVISION	
0	06/01/22	ISSUED	
B	06/01/22	REVISION	
A	04/27/22	ISSUED FOR REVIEW	

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FA# 10072888
USID# 3939
TULIP AVE
7061 CARROL STREET
TAKOMA PARK, MD 20912

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